THE AEROPLANE

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Aeronautical Engineering
Edited by - - THURSTAN JAMES

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AN INDEPENDENT APPROACH

IN the present economic circumstances it is natural that much attention should be directed to the affairs of nationalized undertakings. In the transport field in particular the low earnings of the railways and buses are engaging widespread discussion. In the air transport field attention has been focused on the determined efforts now being made by B.O.A.C. to cut down its engineering and maintenance costs.

However, conditions in the air transport business are not running in the same way as they are for earthbound transport. All the curves of air activity, whether for passenger-miles, freight-ton-miles or capacity-ton-miles on offer, show continuing improvement. Indeed there are plenty of people who are striving to initiate vigorous action over a much wider field than that covered by the nationalized air transport undertakings.

British independent operators of air transport businesses, judged on an international scale, may not have big fleets, but they move a lot of people over a widely flung network of air routes. Total passengers for 1956-57 amounted to more than a million and aircraft miles to more than 30 million. And they have opened an entirely new field to the holidaymaker of moderate means, who is now enabled by the enterprising work of the independents to visit places which not so long ago seemed as far out of reach for a summer holiday as the fabled South Seas.

In this issue of THE AEROPLANE we have devoted nearly half the available space to a survey of the independent operators' activities, and have provided a guide covering nearly 40 names. The list provides particulars of the aircraft employed.

Those who peruse the pages covering the work of the independents will find no polemics about rival ideologies. Except in so far as they determine such things as boundaries and customs barriers, politics should be kept out of civil aviation. The genius of aircraft and power-plant designers has annihilated the barriers of distance; the business of air transport is to see that the resultant advantages are made available as economically as possible to the peoples of the world. At present wealthy people can take three weeks' holiday at distances nearly half the world away from home. The independents have already begun to show that, if allowed to develop in a healthy manner, holidays to similar faraway places could be made available for those with a much lower level of income. That would mean more aeroplanes, more crews, more business. And none of such holiday travel is subsidized.

There is another important aspect which was emphasized before a meeting of the Royal Aeronautical Society some months ago by Mr. M. H. Curtis. He then pointed out that in 1956 the two nationalized corporations and the independent operators produced some 540 million capacity ton-miles. By 1961, he said, the figure should be at least 1,100 million capacity ton-miles and by 1966 the figure ought to be not less than 2,000 million capacity ton-miles. If a policy could be introduced to ensure that within 10 years independents would be operating one-third of the total capacity, instead of around some 10% as at present, then they would be providing some 700 million capacity ton-miles or nearly twice as much as the combined capacity of B.O.A.C. and B.E.A. at the time this lecture was given. In such conditions B.O.A.C. and B.E.A. would then between them be providing some 1,300 million capacity ton-miles.

Such figures, though described by the author as staggering, could in his opinion be achieved with a big combined effort. In the present economic climate it is worth noting that in the same lecture the author remarked that it might be in order to give the state air corporations one, or two or three hundred million pounds of finance to re-equip, but what happens if the capital needs of the air transport industry go up to perhaps one or two thousand million pounds?

There is one aspect of the growing air passenger business that needs thinking about. That has to do with the patronage of passengers which is being transferred from the sea to the air. Because so much of the world's sea travel is done in British ships that loss must hit our own shipping companies but the amount of air passenger business done by British airlines is nothing like so large a proportion of the international total as is the British sea transport business. So not all the passengers lost to British shipping companies go to British airlines. This is a matter of much concern to all of us.

It must be a basic endeavour to ensure for British air transport as a whole a much larger slice of the air transport field. And to do this it would seem logical to enlist the resources of the shipping companies. Mr. Curtis, managing director of Hunting-Clan Air Transport, can speak with authority on this particular aspect, and in the article which he has specially written for this issue, he expresses the view that there is little doubt that if the great shipping companies could see a reasonably sensible policy being applied in the years ahead they would be prepared progressively to invest more in the industry. And that, we might add, must mean an opportunity for the aircraft industry to sell more of their products.

MATTERS OF MOMENT

Comets for Argentina

LAST week the leader of the purchasing commission from the Argentine Government confirmed the good news that six Comet 4s are to be ordered for use by Aerolineas Argentinas, the country's government-owned long-haul carrier. It is expected, subject to government approval, that the contract will be signed before the end of this month in Buenos Aires.

The Comets—which will be used on the routes from Buenos Aires to New York, via Rio de Janeiro and Port-of-Spain, Trinidad, and, later, to London and/or Paris, via Rio, Dakar and Lisbon—are to be delivered in two groups of three aircraft. The first is due in December this year and the next two in January and February so that the New York Comet service can be started in March, 1959. The remaining three are due to be delivered by June, 1960.

The order, valued, with spares, at a little over £10 million, is, we understand, being financed in London with five-year credit terms.

Meanwhile, a decision has apparently been reached about the equipment to be ordered by Tasman Empire Airways, but, at the time of going to press, no positive announcement had been made of the choice of type. It is generally believed, however, that the choice lies between the Lockheed Electra and the Comet 4C—with the New Zealand directors in favour of the Comet and the Australian Government (which owns 50% of TEAL) in favour of the Electra. The first Comet 4 for B.O.A.C., illustrated on this and the next page, is expected to make its first flight before the end of this month.

The Thinking Behind Defence

DR. R. COCKBURN, C.B., O.B.E., Ph.D., M.o.S. Controller of Guided Weapons and Electronics, read a paper on "Guided Weapons and Aeronautics" to the Royal Aeronautical Society on April 10.

Operational requirements of the Royal Air Force were undergoing a radical change, of which, the lecturer said, the nuclear warhead was an even more important cause than the guided weapon. The military economy of the nuclear warhead had made technical advances possible in offensive weapons.

Its ability to annihilate an objective in a single sortie had made performance over the target the sole criterion of the value of the bomber, and supersonic bombers, and the fighters intended to deal with them, had become excessively large and expensive.

Incidentally, the engines for military use had become unsuitable for economic transport.

The attack of the bomber, and also interception by the fighter, at supersonic speed had to be directed automatically and there was little place for human control. Fortunately, the guided weapon could meet these demands and relieve the designer of the need to provide for the human crew; these automatic weapons would be used to deliver the nuclear head, and also in the primary system of defence.

But progress in offensive nuclear weapons had not been matched by corresponding advances in defensive systems and, for at least the next decade, the intercontinental ballistic missile would give the offence an almost absolute superiority. This weapon with a nuclear warhead was capable of annihilating major centres of population, and governments would be deterred from making attacks by the expectation of the retributory annihilation of their own centres of population.

The counter-attack must threaten the heart of the enemy country to be effective; the enemy would not be deterred if only secondary targets could be reached. The weapons must be substantially immune from a surprise attack.

This did not remove the possibility of war; a government would not risk retaliation by starting a major war to defend a possession of secondary importance, and peripheral wars became more probable; these wars must be successfully waged or there would be a danger of defeat by attrition.

The ballistic missile, in contrast to defensive guided weapons, had a self-contained guidance system. The V.2, a tremendous technical *tour de force*, had a range of 200 miles with a warhead weighing a ton and an accuracy of about five miles. "Current weapons," Dr. Cockburn said, "have at least ten times the range and ten times the accuracy of the V.2, their thrust is of the order of a hundred tons, and the structure weight is of the order of 3% of all-up weight."

The need for lightness called for a new approach to structural problems; but the guidance system was the biggest challenge. There was the problem of re-entry. A ballistic missile must dissipate a large amount of energy as it plunged into the atmosphere and, though most of this was left in its wake, the amount left in the missile was still very large.

"As an example," he said, "a spherical satellite of about 1,000 lb. weight and with a specific gravity of 3, reaches during re-entry a temperature of 2,000° absolute and a luminosity comparable with the full moon."

The launching site could be underground, protected from anything except a direct hit by a nuclear weapon, so that defence of a ballistic weapon system needed smaller resources than the defence of an operating bomber force.

The Sputniks had stimulated public interest in space travel but it would be a long time before this could be undertaken with a reasonable chance of a safe return.

New methods of propulsion would be needed for the greater excursions, but the next steps with chemical fuels could be foreseen; kerosene and liquid oxygen, typical propellents, burned at about 3,400° absolute and the exit velocity of the gases was about 1½ miles per second. If 90% of the weight was in fuel, the final velocity could be built up to about twice the gas velocity, three miles per second. If the missile were fired straight up, this would take it to a height of about 1,000 miles above the earth, or to a range of about 2,000 miles if fired on an optimum trajectory.

A three-stage missile allowed 99% of the initial mass to be

Photographs copyright "The Aeroplane"

COMET ROLL-OUT.—The first of the D.H. Comet 4s for B.O.A.C. was rolled out last week and is expected to fly before the end of this month. This picture and the one at the foot of the opposite page were taken at Hatfield at the moment when the aircraft first emerged from the erection shop.

expended in building up the momentum of the remaining 1%, which would be given the velocity of five miles per second required for a satellite. But a velocity of seven miles per second was required to escape altogether from the gravitational field of the earth: this would need a take-off weight of at least a thousand times the final weight.

It was unwise, he concluded, to be dogmatic about the future, particularly about a developing technology; and the findings of this survey depended on supremacy of the offensive weapon. Engineers were wary of general theories or long-term predictions, but a clear technical strategy was needed to avoid dissipation of energy over too wide a field; and a new weapon must be designed to meet the conditions at the end of the 10 years which its development would take.

DR. G. W. H. GARDNER (R.A.E.), opening the discussion, agreed that it was necessary to define the problem which a new project was to solve; everything depended on this decision for the design became more and more committed to that problem, and that problem only, as the years of development went by.

DR. R. R. JAMISON (Bristol Aero-Engines) said that technical progress of air transport, if paid for out of commercial receipts, might become as slow as the development of shipping. Great developments were possible; an aerodynamic and thermodynamic study had shown that speeds of 2,000 to 2,500 knots were feasible for transport aircraft with air-breathing engines.

"KENTIGERN."

A Guided Missile Order

AN order has been placed by the Ministry of Supply with Short Brothers and Harland at Belfast for the development of a small ship-to-air guided weapon. No details of this missile have been given, but it might well be a "descendant" of the weapon shown by Shorts on their stand at the S.B.A.C. Display last year. This was designated the SX.A5 and was described as a multi-purpose surface-to-air test vehicle. It was referred to later in the year by the company's chairman Sir Matthew Slattery who said that they had had some "really outstanding success" with it and hoped that the fruits of that success would come their way. It rather looks as if Sir Matthew's hopes have been realized with this new development contract.

Details regarding the SX.A5 at Farnborough were conspicuous by their absence but a film was shown of several test rounds being fired. It has a characteristic "staggered" fin/wing arrangement, with the rectangular rear fins set at 45° to the swept front wings.

This test vehicle started as a design study undertaken by Shorts on behalf of the Ministry of Supply. Within a few months of the completion of this study, a contract was given to the company for the design, manufacture and test firing of the unit. It has been said that in order to hasten its development as much as possible, the maximum use was made of existing components—presumably from the larger Short G.P.V. test vehicle used in the Ministry's guidance and homing research programme.

The Army's EP.9s

NOW undergoing performance, handling and tactical evaluation for the Army Air Corps, the Edgar Percival EP.9 has been simply and rapidly adapted for military use, since many of the characteristics of a versatile liaison aircraft are inherent in its design. Two aircraft are involved in the initial Army contract, with slightly modified cockpit layouts to accommodate, under the starboard front panel, an Army Type 62 HF radio, for which an aerial runs between the cabin top and the fin. Full military night-flying equipment is also fitted, with landing and taxi-ing lights under the wings, adjacent to the racks for supply containers.

Located outboard of the wing-strut attachment points, the racks each have a maximum capacity of 500 lb., for supply containers or more lethal stores. Dropping tests with parachute containers have shown clean separation and satisfactory canopy deployment.

An ingenious and quickly detachable set of attachments, which is also available for civil application, has been

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developed for loading two stretcher patients into the rear cabin of the EP.9, through the removable clamshell door. As the stretchers prevent access through the port door of the cabin an additional entry hatch has been provided on the starboard side of the Army EP.9s for the medical attendant, who has an aft-facing quickly detachable seat.

For communications or liaison duties the cabin has four comfortably upholstered seats. Alternatively, all the cabin fittings may be removed in a few minutes to allow the maximum payload for freighting. Provision is also made for vertical cameras to be mounted over floor apertures.

Other EP.9 developments include the provision of an auxiliary external fuel tank, of 17 Imp. gal., attached by four bolts to the starboard side of the fuselage. Under the latest B.C.A.R.s, it is not possible to fit a ventral fuel tank without fire- and crash-proofing, but the slab tank avoids this problem.

High-altitude Escape

THE successful ejection, on April 9, by Flt. Lt. John de Salis and Flg. Off. Patrick Lowe, at 56,000 ft. from the height record-holding Scorpion-Canberra was certainly the highest ever made, although parachute descents have been undertaken, principally by the Americans, at considerably greater altitudes. Survival of the R.A.F. crew in the circumstances of last week's accident was a remarkable tribute to their safety equipment, including Irving parachutes and Martin-Baker ejection seats.

The seats installed in the Canberra are of the oldest type in service, the Mk. IC, which was originally designed in 1948 as a non-automatic unit, and was subsequently modified for semi-automatic operation. Unlike newer seat designs, the Mk. IC works on the principle of almost immediate separation after ejection, with a barometric release and emergency oxygen built in to the crew member's parachute. This means that the two R.A.F. survivors made a free fall from 56,000 ft. to about 12,000 ft.

Both men were, of course, wearing partial pressure suits, and were dependent on their emergency oxygen for survival during the long fall of about three minutes.

The nature of the emergency to the Scorpion-Canberra has not been revealed, but it seems probable that a fairly drastic situation arose to necessitate ejection at such an extreme height. Reports indicate that the Double-Scorpion rocket was not operating at the time, and it has been suggested that the Canberra ran into the "coffin corner," or the narrow speed band of about 15 knots between high-speed compressibility and a low-speed stall, during a descent from about 70,000 ft.

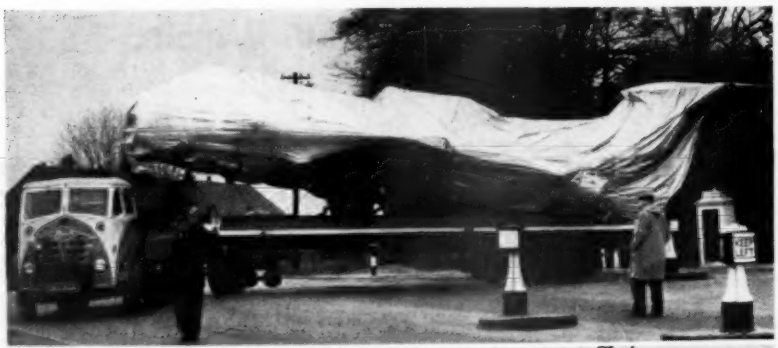
At the time of the accident, the Scorpion-Canberra was operating from R.A.F. Hemswell, where No. 76 Squadron is based. Canberras from this squadron took part in the British nuclear tests in the Pacific last November, on cloud sampling duties. Another Scorpion-Canberra is reported to be available for the forthcoming nuclear weapons tests on Christmas Island.

Lights in the Sky

FOR four consecutive evenings last week Sputnik Two was clearly visible, in the London area, during its last few circuits of the Earth. Appropriately enough, our first sight of it—in the expert company of Mr. A. V. Cleaver and Mr. A. Clarke, both past chairmen of the British Interplanetary Society—was after listening to Dr. Cockburn's lecture to the R.Ae.S. on guided missiles on April 10. It seemed somewhat significant, to say the least, that one could spend a couple of hours hearing an esoteric dissertation on matters concerning ballistic deterrent weapons which are closely allied to astronautics and then proceed—within a matter of minutes—to the quiet and peaceful darkness of St. James' Park to watch a visible demonstration of man's first step into space. A small bright light speeding steadily across the sky from north west to south east. We found it a little awe-inspiring.

Warned by Arthur Clarke that Sputnik Two was likely to be visible about the same time (20.24 hrs.) the following evening, we decided to try for another view. This time we observed it from the Temple Press roof and again, almost uncannily, on time and on course, sped the small bright light.

Saturday evening again presented a clear sky and we tried again. With the satellite getting lower and nearing its end, it appeared earlier this time—at about 20.10 hrs.—but it was just as bright and just as steady. And on Sunday evening, too, round it came at about 19.50 hrs.—much earlier and a little brighter—but still unfalteringly orbiting. It seemed a pity that it was moving towards inevitable extinction.—F.T.M.



An R.A.F. Club Reunion

A LARGE and distinguished company sat down to dinner at the Royal Air Force Club on April 9, on the occasion of the first reunion for members of the Club who had been on its register when it was located at Bruton Street. It was at the beginning of 1922 that the R.A.F. Club moved into its present headquarters at 128 Piccadilly.

At this first reunion, the Club's president, Marshal of the R.A.F. Sir John Salmond, G.C.B., C.M.G., C.V.O., D.S.O., D.C.L., LL.D., presided; and the two principal guests were the C.A.S., Marshal of the R.A.F. Sir Dermot Boyle, G.C.B., K.C.V.O., K.B.E., A.F.C., and the chairman of the R.A.F. Club, Air Vice-Marshal J. G. W. Weston, C.B., O.B.E.

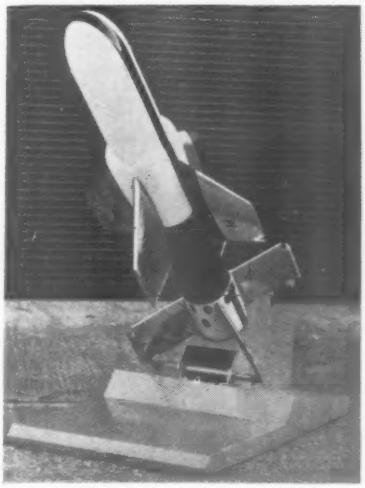
Two New Aeroplanes

FROM Brough comes the news that the Blackburn and General Aircraft NA.39 has been transported by road to Thurleigh, near Bedford, for its first flight. The photograph alongside shows it on its way.

Douglas Aircraft have completed the first DC-8 jet airliner and the second photograph shows the aircraft being rolled out of the Long Beach production factory just 11 months and a day after the plant was formally dedicated. This DC-8, the first of 138 on order, is expected to fly in May or June.

News of Aircraft, Engines and Missiles

ROTODYNE PROGRESS. — Last week an important phase in the development of the Fairey Rotodyne was reached when, on April 10, at White Waltham, it achieved a transitional flight. The craft was climbed to 4,000 ft. as a helicopter before power to the rotor was closed down and transferred to the propellers. The Rotodyne then flew in straight, level and steady flight before the procedure was reversed and a landing made as a helicopter.



SHORT MISSILE.—This small general-purpose surface-to-air test vehicle was first exhibited by Shorts at the S.B.A.C. show last year. As recorded elsewhere in this issue Shorts have now received an M.o.S. development contract for a small ship-to-air guided weapon.

A GIFT OF MODELS

THE Royal Aeronautical Society recently received, as a gift from Mr. L. Morgan, of 29 Bloomfield Road, Gloucester, four beautiful models of "classic" aircraft. Made from solid brass, they are 1/24 scale representations of the Wright Flier No. 1; the Blériot XI monoplane; the Vickers Vimy, and the "Spirit of St. Louis."

Mr. Morgan intends to round off what he calls the "Seven Winged Pillars of Aeronautical Wisdom" with the Supermarine S.6B, the Spitfire and the Whittle Jet. When complete, the set should form an excellent commentary in brass on the development of the aeroplane. A photograph does scant justice to the models as Mr. Morgan has gone to infinite trouble to get everything correct to the last detail. The Blériot, for instance, has movable controls, the guns of the Vimy are detachable, the Flier rests on a separate cradle on its rail, the vanes of the anemometer on the "Spirit" are revolvable.

What makes the craftsmanship all the more remarkable is that they were done on a kitchen table for a bench and with the scantiest of information and drawings.—F.S.

FIELD FELINE.—The Grumman Ag-Cat has been designed specifically for agricultural work. Two prototypes have been flying since early last year and the first production aircraft is to appear this summer. Alternative engines of 200-300 h.p. may be fitted. Length, 24 ft. 8 in.; loaded weight, 3,600 lb.; hopper volume, 29 cu. ft. (219 U.S. gal.). Maximum speed, 110 m.p.h.

OLYMPIA 419.—As we briefly announced last week, comparative tests of the EoN Olympia 419 single-seat sailplane have proved it to have a performance superior to that of any other British sailplane. Its performance, at all speeds, is in fact from 3% to 5% better. We understand that if a second aircraft is available in time it will be flown in the forthcoming World Championships. The first one is to be flown by Col. A. Deane-Drummond.

GLIDING RECORD.—Subject to confirmation, Mr. David Ince, flying the new EoN Olympia 419 sailplane on April 13, broke the U.K. gliding distance record, covering 315 miles from Lavenham, Suffolk, to Sennen, near St. Just, Cornwall.

TAON FOR NATO.—It is reported that France has recommended the Breguet Taon light ground-attack aircraft for evaluation in the second phase of the NATO light strike-fighter programme, following the order of a batch of Fiat G.91s for the first phase.

MISSILE MONEY.—A total of $258,538,000 for guided missiles, drones and equipment has been asked of Congress by the U.S. Navy for 1959. This does not allow for $700 million for speeding-up the Polaris submarine-launched programme. Missiles covered by the budget are Terrier, Tartar, Talos, Sidewinder, Bullpup, Corvus, Sparrow III, Regulus I and II, Polaris and Subroc. A further $25,600,000 is required by the U.S. Marines for Terrier, Hawk and Lacrosse missiles.

LOCKHEED SALES.—Record sales totalling £310 million were made by the Lockheed Aircraft Corpn. during 1957. Missile-satellite sales were £26 million; they are expected to total £64 million during 1958. The backlog of orders at the end of 1957 was £457 million, of which £126 million were for commercial aircraft.

NEW CZECH.—The Aero HC-3 is a new six-seat helicopter designed in Czechoslovakia. It has a 240-b.h.p. engine, presumably the Praga Doris flat-six, and follows the form of HC-2 in having a single main rotor. A four-wheel undercarriage is used.

TOWARDS A FLIGHT.—According to reports in the Press, the prototype Blackburn and General Aircraft NA.39 strike aircraft for the Royal Navy has been transported by road from Brough to Thurleigh, Beds., where it is to do its preliminary flights. Thurleigh is the aerodrome associated with R.A.E. Bedford. The NA.39, it would appear, is likely to make its maiden flight in the very near future; it has two Gyron Juniors.

NEAT NEWCOMER.—Built in Italy by Aer Lualdi, the four-seat L.55 has a Hiller rotor system and is powered by a 180-b.h.p. Lycoming engine. Gross weight is 2,200 lb.

X-15 SATELLITE?—Rocket-boost engines have been developed which could put the X-15 high-altitude research aircraft into orbit. This was stated by the chairman of North American Aviation, Inc., Mr. J. Kindelberger, who said that putting the X-15 into orbit would be the logical development of the present U.S. experimental policy.

ENGINE TROUBLE. — Lockheed F-104A Starfighters fitted with the General Electric J79-3A turbojet have been grounded because of "roughness" experienced recently in flight.

CZECH TYPES.—Two new light aeroplanes from Czechoslovakia are the Aero 50 and Praga E-55. These seem to be designed to the same specification since both have single-engined, high-wing pod and boom layouts. The former has a single fin and the latter, two fins.

SWEDISH TANDEM.—The first of four Vertol V.44 helicopters was recently delivered to the Swedish Navy for anti-submarine duties.

Commercial Aviation Affairs

POLAR BRITANNIAS.—Canadian Pacific Airlines will introduce Britannias on their Australian-Vancouver polar route on June 1, at a frequency of twice a week. There will be a refuelling stop at Frobisher (Baffin Island) westbound; eastbound, the service will operate non-stop. The first C.P.A.L. Britannia (CF-CZA), now fully furnished, was officially handed over to the airline at Belfast on April 1.

DC-8 ROLL-OUT.—The first Douglas DC-8 was rolled out at the Long Beach production factory on April 9, and has been handed over to the Testing Division for completion of instrumentation and ground testing prior to the first flight.

AIRWORK VISCOUNTS.—Airwork, Ltd., has ordered two Viscount 831s (810-series) for use as 60-seaters on their Safari service. Delivered before the end of this year, they will supplement the two Viscount 736s purchased from Fred Olsen.

SELLING STRATOCRUISERS.—B.O.A.C. have arranged to sell back to Boeing Airplane Co. 14 of their 16 Stratocruisers, the proceeds to be set against the purchase price of the 15 Boeing 707s. The Stratocruisers will be returned between September 30, 1958, and July 31, 1959, and will be re-sold by Boeing after overhaul.

F-27 ROLL-OUT.—The first Fairchild F-27 was rolled out at the Hagerstown factory last week and is now starting flight tests.

B.E.A. IN ABERDEEN.—A new sales and reservation office and town terminal was opened by B.E.A. in Aberdeen on April 8. It is at 335-337 Union Street, and is necessary to cope with rapid growth in traffic at Aberdeen, where passenger traffic has increased from 13,000 in 1951-52 to 30,500 in 1956-57 and an estimated 33,000 in the present year.

AIR FRANCE POLAR.—Air France inaugurated their Paris-Tokyo polar route on April 10. The service, once a week, calls at Anchorage and is flown by Lockheed Starliners in 31 hours, compared with 45 hours on the existing route via Delhi and Saigon.

DC-4s FOR GERMANY. — Two Douglas DC-4s have been purchased from Twentieth Century Aircraft by Lufttransport Union of Frankfurt. They will be used for non-scheduled charter flights. Contract price was stated to be about $750,000.

AIR FRANCE AND MEXICO.—Following the start of the Mexico City-New York services by Aeronaves de Mexico, the Mexican Government has revoked the provisional permit by which Air France was permitted to carry traffic between the two points.

SUPERSONIC FORECAST. — Mr. Kelly Johnson, Lockheed vice-president of engineering and research, has forecast that a supersonic airliner could be in the air in 1963 or 1964, and in airline service two years later. He suggested such an aircraft would weigh 450,000 lb., have a wing loading of 40-50 lb./sq. ft., and fly 3,500 miles at 2,000 m.p.h. at 80,000 ft. It would use afterburners to accelerate to cruising speed above 50,000 ft.

MORE TO AUSTRALIA.—B.O.A.C. has increased the frequency of its Australian service to four a week—one first-class and three mixed class, all operated by Britannia. Qantas have reduced their frequency from five to four.

CAR AIRLIFT.—An agreement lasting a year has been signed by the French car manufacturing firm of Renault and Silver City Airways whereby the airline will ferry Renault cars for sale in this country from Le Touquet to Ferryfield.

IATA FLEETS.—A recently published list of the aircraft used by IATA-member airlines gives a total of 2,900. Of these 1,484 (51%) are four-engined types. The totals of individual types in service are, of course, headed by the DC-3, 694 of which are flying with the IATA airlines.

DOMINICAN PURCHASE. — Compania Dominicana de Aviacion (C.D.A.), the Dominican national airline, has purchased a Douglas DC-4—the company's first four-engined equipment—for use on its new Miami—Ciudad Trujillo service.

"Guided Missiles and Astronautics"

NEXT week's issue of THE AEROPLANE will be an enlarged number with many special features devoted to the above-mentioned subjects. It will cost the usual 1s. 6d.

VICKERS VISITORS.—Inspecting the Vickers Viscount production line at Weybridge on April 11 was this party from Poland, including Mr. A. Skala, general director of L.O.T., Mr. W. Leja and Mr. A. Wojnowski, vice-directors of the airline, Mr. J. Rustecki, Vice-Minister of Transport, and Mr. J. Zwierzynski, director of the civil aviation department.

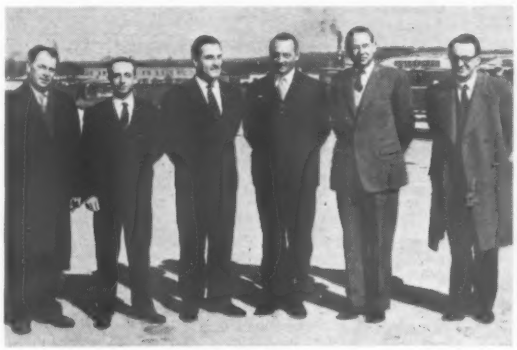
GOLDEN CITY.—Following last December's fare reductions, Silver City's vehicle-ferry bookings have shown remarkable increases. More than 30,000 reservations have been made so far this year—by comparison with 14,000 at about this time in 1957. The airline's new London headquarters, Silver City House, at 62 Brompton Road, S.W.3, were officially opened on April 9.

LESSENING ACTIVITY.—Air transport movements and passenger traffic at U.K. aerodromes in January, 1958, were only 1% above the figures for January, 1957. Freight was down by 19% and mail by 10%. London Airport recorded a 6% increase in movements and passengers; movements at Ferryfield increased by 280%, and Edinburgh by 12%.

IATA AT YEOVIL.—Members of the IATA Helicopter Committee toured the Westland helicopter works at Yeovil recently. They inspected the mock-up of the 42-seat Westminster.

DUTCH SERVICE.—N.V. Aero Contractors, of The Hague, the formation of which was noted in THE AEROPLANE for January 17, intends to start in the summer a provisional service of two helicopter flights per day for passengers linking Rotterdam, The Hague and the Briesle Maas (Meuse) River south of the island of Rozenburg. Other schemes under development by the company are for the training of helicopter pilots, and helicopter maintenance. The company at present operates 13 helicopters.

News About People



BROUGH VISIT.—The Italian Air Attaché, Col. G. Pelosi (third from left) recently visited Blackburn and General Aircraft. With him here are, left to right, Gp. Capt. S. Wroath, Capt. Carosio, Capt. E. D. G. Lewin, Capt. E. R. S. Jackson and Maj. C. Vallance.

G.W. MANAGER.—Mr. David Ince, who has been test-flying the new EoN Olympia 419 sailplane, is to become divisional manager, guided-weapons division, of Elliott Brothers (London), Ltd., at the Boreham Wood laboratories on May 1.

DOCKER APPOINTMENTS.—Some changes in executive staff appointments have been announced by Docker Brothers. Mr. D. M. Wiggins has been appointed sales manager and Mr. B. C. Payne takes over as manager, Aircraft Sales Division. Mr. W. C. Dudley has joined the company as aircraft representative in the London area.

Mr. Wiggins has been with Docker Brothers for some years. During the War he was commissioned as an Engineer Officer and in 1943 became C.O. of No. 3501 Servicing Unit after which he was C.T.O. of Tangmere sector and of No. 11 Group. He was later on the Engineering Staff at H.Q. Fighter Command.

AIR LEAGUE COUNCIL.—Mr. W. J. Carron, president of the Amalgamated Engineering Union, and Gp. Capt. D. R. S. Bader, C.B.E., D.S.O., D.F.C., of the Shell Petroleum Co., Ltd., have joined the Council of the Air League of the British Empire.

ROYAL VISIT.—H.R.H. The Prince Philip will visit Shoreham on May 20. After seeing the harbour installations in the morning he will drive to the airport to visit F. G. Miles, Ltd., where the M.100 jet trainer and HDM-105 commercial aircraft will be on view. He will meet the heads of the companies in the Miles Group, inspect the premises of Miles Electronics, Ltd., and see examples of work by Miles Structural Plastics, Ltd., Miles Development Products, Ltd., and Meridian Airmaps, Ltd.

REPRESENTING B.O.A.C.—Mr. Guy Norman has been appointed to represent B.O.A.C. in Western Britain. He joined the Corporation two years ago and has been attached to the headquarters sales branch.

WRITERS MEETING.—First formal meeting of the newly formed British branch of the International Society of Aviation Writers (ISAW) was held on March 20 at Londonderry House, London, W.1. A committee was elected, with Mr. B. J. Haimes as chairman, and Mr. F. C. Gillman of B.O.A.C. spoke on the "Problems of an Airline P.R.O."

ORENDA POST.—Mr. Earle K. Brownridge has been appointed executive vice-president and general manager of Orenda Engines, Ltd. He joined A. V. Roe Canada, of which Orenda is a subsidiary, in 1945.

Military Aviation Affairs

VAMPIRE ORDER.—The Venezuelan Air Force has ordered five D.H. Vampire Trainers for delivery by the summer. It already operates a number of Venom and Vampire fighter-bombers besides a number of Canberras.

AIRCRAFT DIRECTION FRIGATE.—H.M.S. "Llandaff," the second ship of the Salisbury class of frigates to be completed, has been accepted into service. Frigates of this class are designed primarily for the direction of carrier-borne or shore-based aircraft.

NAVY PLANES.—New aeroplanes for the U.S. Navy to be bought in the next financial year include the twin-engined Grumman A2F-1 and W2F-1, and a version of the Lockheed C-130 for flight refuelling and Marine troop transport operations.

FAST FLIGHT.—A U.S.A.F. Boeing KC-135 Stratotanker has flown non-stop from Tokio to the Azores, a distance of 10,233 miles, in 18 hr. 48 min. This is the longest flight ever made by a jet aircraft without refuelling, and the KC-135 flew east across the Pacific, over the U.S. and crossed the Atlantic, in an attempt to reach Madrid.

CRUSADER COST.—According to an agency report, the Chance Vought F8U-3 Crusader costs about $9,900,000 (£3,535,000) of which about half is accounted for by electric control equipment.

JAP TIGERS.—Grumman F11F-1F Super Tigers are to be bought by the Japanese Defence Agency. They will also be made in Japan later on.

VOODOO ORDER.—A U.S.A.F. contract for $58,140,000 has been awarded to McDonnell for 84 F-101B Voodoo interceptors.

DAM BUSTERS.—Officers of No. 617 Squadron, R.A.F., recently visited the A. V. Roe and Co. factories at Chadderton and Woodford. This Squadron is shortly to be equipped with Vulcan bombers. In the middle of the group is the C.O. Wg. Cdr. D. Vower with Mr. E. Galitzine, Avro sales manager, and Gp. Capt. E. C. Dearth, R.A.F. Liaison and Security Officer (right).

AIR TRANSPORT

Britannia's U.S. Certificate

THE Bristol Britannia received its full American airworthiness type certificate on April 10, becoming the third foreign turboprop transport to do so (after the Viscount and Friendship). No American-designed turboprop or turbojet transport has so far been certificated by the C.A.A. The Britannia's certificate was handed to Dr. A. E. Russell by Mr. R. B. Myersberg, representing the C.A.A.

To obtain American approval for the Britannia, Bristol Aircraft had to satisfy 115 special conditions, imposed by the C.A.A., which differed from British requirements. Many of these were small details; the most difficult and extensive were the requirements for an individual passenger oxygen supply system and the need to pivot on one main undercarriage unit.

Granting of the American certificate opens the way for use of the Britannia by Northeast Airlines. This operator ordered five Britannia 350s in December, 1956, and hoped to have them in service on the lucrative New York-Miami route in time for the 1957-58 winter season. Production delays made it impossible for the American certificate to be obtained and deliveries to be made so quickly, however.

Northeast Airlines subsequently renegotiated the contract with Bristol to cover deliveries in the autumn of 1958, and one of the terms of this contract was that the American certificate should be obtained by May 1. Thereafter Northeast has 60 days in which to arrange the necessary financing and secure the consent of its lending banks to purchase. Mr. George E. Gardner, company chairman, said recently that the Britannia is ideally suited for first-class service in the Florida market, and will complement the ten DC-6Bs used by Northeast at present.

The Third Air Transport Course

THE Royal Aeronautical Society's annual Air Transport Course—the third in the series ended last week-end—is probably unique in the programme of adult education and in world civil aviation. Started in 1956, perhaps rather tentatively, this three-week grounding in airline problems has now, we hope, become an essential part of the air transport business.

The lectures—which cover economics, operations and air law—are valuable enough, but probably the most important feature of the course is the fact that students and lecturers are living-in during the three-week period at Oriel College, Oxford, and are thus able to exchange ideas and experience in a way which only residential collegiate life makes possible.

This year the resident lecturers included one from overseas—Mr. D. C. Tennant, director of operations planning for Trans-Canada Airlines. Everyone hopes that next year it will be possible to include, if only amongst the guest lecturers, representatives from the U.S. aircraft manufacturing industry. Not that there has been any shortage of guest and other talent; the guest lecturers and speakers included airline and other executives from six countries and dealing with about a dozen subjects. The 34 students (if professional aviation people can so be described) came from nine countries.

The dinner at the end of the course provided a typical finale last Friday night. Every one of the speakers managed to say serious and important things without allowing themselves for a moment to appear to be either serious or important. For the record, these speakers were Sir William Hildred (who excelled even himself), Sir Arnold Hall and (post-toast-list, for the "boys"), Capt. Bernard C. Frost (B.O.A.C.) and Jacinto da Silva Medina (D.T.A., Portuguese West Africa), who, as senior student from overseas, was elected to make a few important little end-of-term, class-to-master presentations.

LOT to London

THE reappearance of Poland's national airline, LOT, at London Airport last week was of more than routine interest, for this operator alone among the airlines of Russia's satellites has shown a preference for Western equipment. The Warsaw-London service, which is being flown twice a week by LOT, is served at present by the three Convair 240s purchased last year from Sabena. This purchase was in itself significant and was made possible only by the lifting by the Western Powers of an embargo on strategic exports to Eastern bloc countries. Now that the precedent has been established, the possibility that LOT will be able to buy Viscounts cannot be dismissed.

When Polskie Linie Lotnicze chose to buy Convairs, it was already operating 30 Li-2s (Russian-built DC-3s) and was in process of replacing Il-12s with a dozen Il-14s, built in East Germany. These aircraft are still used.

On the inaugural service into London, LOT carried several of their own executives, including Mr. A. Skala, general director and representatives of the Ministry of Transport, including Mr. J. Rustecki, the vice-minister. This party wasted little time proceeding to Vickers-Armstrongs' works at Weybridge, where the Polish visitors spent some time on April 11 inspecting the Viscount and Vanguard production lines and the Vanguard mock-up. They showed evident satisfaction with what they saw and were told, and although it is too early yet to think in terms of a positive order, LOT's interest in the Viscount is certainly more than academic.

There are difficulties, of course, both financial and political. We asked the LOT party whether they could not more easily obtain Russian equipment, to which the reply was that the Tu-104 fitted neither LOT's particular routes nor Poland's airports, while the newer turboprop types were as yet unproved and the airline would prefer aircraft of known performance.

BRISTOL FOR AMERICA.—The first Northeast Airlines Britannia, in its new livery, seen at Filton where it has been modified and furnished after being built at Belfast. The Britannia now has its American C. of A.

Britain's Private-enterprise Air Transport Operators

THIS and the following 13 pages of the issue are devoted to a review of the British independent airline operators. A major part of the available space is devoted to a guide in which the work, constitution and history of the different companies are individually detailed.

On these four opening pages we offer a brief survey of the present political position, followed by some forthright views from an operator and a description of the responsibilities of the independents' own trade association. Following the guide comes an outline of the work of the Baltic Exchange.

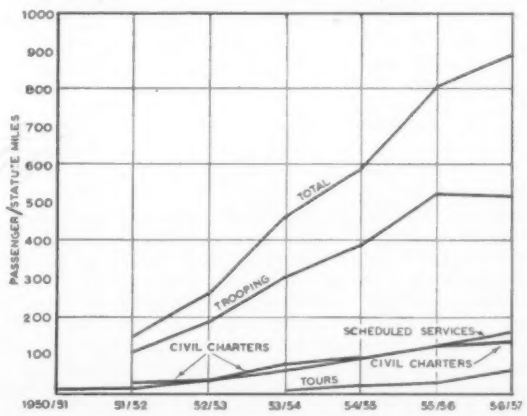
The position of the British independents is much as it always has been, but there are signs, perhaps, of a little growing light in the political scene, with a better understanding of the situation of the nationalized Corporations in relation to the private operators.

The background history of the independents and their necessarily slow progress towards greater freedom of action is dealt with in the two articles which follow—so we will give here only a brief outline of the various changes in Government policy which have led to the present position before turning to a few general statistical facts and to the changes which seem to be appearing in the political climate.

The question now is whether the time has come to give the independents, once again, a little more scope—and whether the political climate will allow this little more to be given. People are inclined to forget that it was a Labour Government which, in spite of an ideological preference for a monopoly for the nationalized airlines, introduced the associate agreement system in 1948-49.

Civil air trooping, too, was introduced in 1950 and the work has since been done almost entirely by the independents. From 1951 onwards trooping has, in fact, been the predominant operation for the independents and at present involves nearly 60% of their total passenger-miles. There were good practical reasons for these relaxations, but, nevertheless, ideologies were allowed to be subservient to needs. This could happen again—and the only permanent, and therefore permissible, changes in the air transport pattern are those which can be accepted on both sides of the House.

Since 1950 the only important changes in the situation were

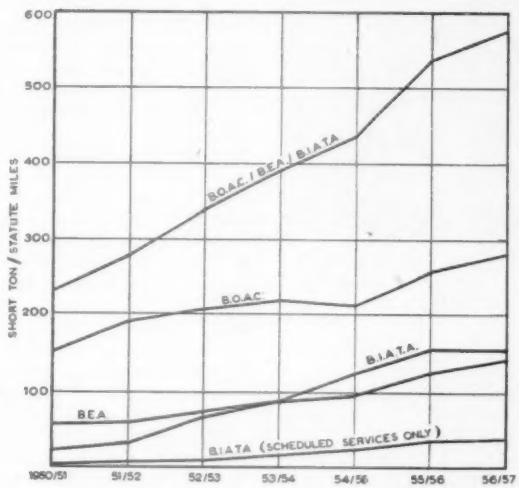


This graph shows the 1950-57 passenger-mile results (in millions) of operations by BIATA members broken down into the main work categories.

those made by the present Government soon after it came into power. In 1952 the independents were given a so-called "new deal." The terms of reference of the Air Transport Advisory Council (which, in effect, recommends route licences) were changed in a way which permitted the Council to consider, on comparatively equal terms, applications for new route approvals by the independents.

The freedoms offered by the 1952 policy could not be expected to have provided very extensive new business for the independents, but the modifying effect of this policy has had one very important result. Those carriers who took advantage of the limited scheduled opportunities have had a chance, during the past five years, of learning a great deal about airline operation and all that this means in day-to-day practice.

The tables (on page 536) might suggest that the progress of the independents since 1952 has been considerable. So it has been—but only in simple statistical terms. The annual increases (until 1956-57) have been as large as might have been expected



The total U.K. 1950-57 capacity ton-miles (in millions) compared with the capacity produced by the two Corporations and BIATA member operators. Note the small share of total scheduled capacity offered by the independents.

from a start more or less at zero. In 1950-51, for instance, the capacity ton-miles produced by the independents for scheduled services represented only about 1% of the U.K. total. The proportion had risen in 1954 to about 5% and is at present about 8%. If the effect of inclusive tours is introduced, the figure is still only about 10%.

The proportion of total U.K. capacity ton-miles offered by the independents (at present running at about 27-30%) may seem to be more satisfactory—but the scheduled figures are the really important ones since only such operations offer the necessary stability on which an air transport business can be developed.

If we accept, as we must, the continued effects of a political stalemate, what are the chances of a fourth "new deal"?

Nothing very remarkable in the way of a change can be

expected, but there are signs that some improvements are likely. No doubt, if there were to be a General Election tomorrow and the Labour Party were to come into power, there would be one or two sternly announced ideologically based changes of a minor nature designed to satisfy election-time needs. But any such moves would be gestures rather than positive changes in the general policy.

Certainly the thinking of the Government and the Opposition seems to be more reasonably parallel today than it has been since 1951. The little debate in the Commons on air transport development on February 28 this year provided several signs of the way in which Opposition members are now thinking. Naturally, the emphasis was on the need for the independents to work alongside the Corporations—with a hint that the more co-operative private carriers might receive preferential treatment—but there was no doubt, during the debate, that the problems of the independents were well understood.

Most significant and encouraging were the following comments made during this debate by Mr. Frank Beswick—probably the Labour Party's most knowledgeable spokesman on aviation matters.

"I believe," he said, "the smaller, enterprising operator has a contribution to make. In charter work, in freight and in those specialist, individualist services such as the air-coach or the car-ferry operation there are independent operators who have shown initiative and ideas, and they should be encouraged. The inclusive tour is a project which, properly licensed and kept within reason, is clearly an operation in which the private operator can make a special contribution and in which he should be given some security of outlook.

"I make this one final point about security. As I have said before, I think that those smaller companies that fill in the gaps, that complement the services operated by the Corporations, should be enabled to do so with some sense of stability and security. . . ."

It is early yet—and there were many hard things said during this debate about the independents—but the impression gained by the onlooker was that we are nearer now than we have ever been to a rational, non-political, non-ideological policy for British air transport. It is obvious that something must be done to offer stability and development prospects to the independents.

An Operator States the Case

Mr. Maurice H. Curtis, managing director of Hunting-Clan Air Transport, the author of this vigorous article.

BRAVE words were spoken in 1952. The Government then declared its intention of adopting a policy towards the British air transport industry which "favoured a blend of public and private enterprise in whatever way was in the best interests of British civil aviation."

But brave words are meaningless unless backed by brave action. To implement such a declared policy it was essential that conditions should quickly be created which would encourage substantial private investment in the industry. That meant ensuring access by private enterprise operators to sound commercial air transport ventures, giving prospects of a reasonable return on investment in due course. In addition, there was the very practical consideration that almost all the independent operators were equipped with rapidly obsolescing aircraft; and, as it would take two to three years to procure more modern types, urgent practical steps by the Government to implement its policy were essential if its own intentions were not to prove abortive.

The Government, however, was bound by the terms of the Air Corporations Act of 1949 and when it came to the point was apparently unwilling to amend that Act in even the smallest way to give the independent operators access in their own right to some share of the more worthwhile opportunities in British air transport.

The furthest it was apparently prepared to go was to amend the terms of reference to the Air Transport Advisory Council so that independent operators (and the Air Corporations) were free to apply for certain types of scheduled services in carefully defined categories. Those categories are now well known and include all-freight, Colonial coach class, inclusive tour, vehicular ferry services and so on; and also any "normal" category service which linked traffic areas not already covered by the two Air Corporations.

Altogether a very unpromising portfolio from the point of view of potential profitability when one looks at the true commercial worth of this gesture. First, all these operations are in the low-revenue category. Secondly, under the Air Corporations Act, if they were to operate any scheduled services at all the independents had to enter into associate agreements with the Air Corporations, so there was little real security of tenure in any of the services granted to the independent operators. Thirdly, the need to prove "no material diversion of traffic" from the routes of the Air Corporations was an almost impossible task on any major route sought.

It is no secret that such a half-hearted attempt to "blend public and private enterprise" was a great disappointment to most of the independent operators—and certainly to all those who were prepared to make substantial investments in the industry and to develop their operations on a long-term basis. As soon as the terms of reference to the A.T.A.C. were known, the independent operators made it clear to the Government that the extremely limited opportunities opened to them were woefully inadequate—and that the A.T.A.C. would be nearly hamstrung in its deliberations by the very ambiguity of the "no material diversion of traffic" proviso to be applied to all applications.

On the one hand the independents could, and did, apply for various services which, in their view, would generate new traffic and result in only very insignificant diversion from the traffic of the Air Corporations—if any at all. On the other hand, the Air Corporations could argue, and often did, that their future plans provided for the carriage of *all* traffic on virtually *all* routes and in *all* categories of service which could be dreamed up for the future, so that *any* operation permitted the independent operators was therefore a diversion of the Corporations' planned traffic! It is a wonder that the A.T.A.C. was able to function at all under such ambiguities—particularly when remembering that it is purely an advisory body and not a licensing authority, and is not, therefore, set up to investigate on its own all the opposing economic and other arguments submitted to it.

However, having expressed their extreme disappointment to the Government, most of the independent operators decided they would endeavour to develop operations within these very limited categories. They felt that they needed to show the Government and the public they were able to provide scheduled services at a high level of regularity and punctuality. They also believed that the Government had not recognized that there was still a vast potential expansion for the air transport industry and that it *could* continue to expand at the same rate that had applied since the end of the War. Many of the independents felt that, when it became apparent that a continuation of this rate of expansion was possible, there would then be no hesitancy on the part of the Government in ensuring that they had a sensible

share of this new traffic which would be generated in the future.

Thus the task the independents set themselves—or rather had set for them by the Government—was to operate aircraft to standards as high as those of the Corporations and as near as does not matter with the same unavoidable cost elements, and at the same time to exist on categories of operations which were incapable of earning more than a fraction of the revenue per capacity-ton-mile that the Air Corporations were able to earn on the routes and services reserved to them.

But the independents nevertheless set to with energy to show that they could generate new traffic, serve the public, operate to high standards, and in many cases earn some margins of profit—in the belief that, having "won their spurs," they would in all justice be allowed more secure and commercially worthwhile opportunities. Some of the operators, with long-term possibilities in view and with the object of giving the Government's policy maximum support, took up operations which were breaking into such new fields that they would inevitably lead to substantial losses during development periods. But here again they felt that they were helping to sustain and accelerate the expansion of the industry and that with such expansion these pioneering efforts would lead to the Government taking a more practical look at the situation.

Under these almost crippling conditions it is remarkable that the independent operators have, in this six-year period, achieved so much. Some of these achievements are recorded elsewhere in this issue of THE AEROPLANE, so there is no point in repeating them here. But, however substantial are these achievements *statistically*, they mean little unless the independents can see clearly ahead of them opportunities for expansion, more profitable operations, justification for the purchase of new fleets and prospects of attracting new capital.

Therefore it is to the true circumstances of the independent operators, and to their future opportunities, that the thoughts of all interested in the British air transport industry should now be turned. In saying this, I am assuming that Governments, present and future, and the public want to see an independent element in the British air transport industry. If they do, then changes in present policy and practices are essential; if they do not, then such a negative objective can simply be achieved by continuing with the present policies and practices without change.

The Position Today

Looking at the operations at present open to them, the position seems to be roughly this:—

Air trooping is of doubtful value. Trooping contracts have been awarded on a short-term basis and, the future disposition of British troops overseas being uncertain, the requirements of air trooping are likewise uncertain. Even the proposed sale or lease of three Britannia aircraft to independent operators for air trooping is of little value under the conditions proposed for the contracts, as no private concern is likely to enter into the extremely heavy capital expenditure involved if the Government can, at any time, cancel the contract for the operation of these aircraft at very short notice. In any case, the work of three Britannias is but a flea-bite compared with that of the future potential size of the air transport industry.

Colonial Coach class services as such are gradually disappearing as former Colonial territories attain their independence within the Commonwealth—or possibly outside the Commonwealth in some cases. Admittedly, those operators on the African routes who have been developing Colonial Coach class services will be allowed a share of what is known as the T34 (really third-class) traffic on those routes over which they have been operating. However, the meaning of such a share in actual numbers of passengers and frequency of service is pure guesswork at the moment, and it is possible that this so-called share may, in the event, turn out to be of little value.

Inclusive tours are a type of service which has been energetically developed by the British independent operators to the extent that these services are now used by tens of thousands of British holiday-makers every year; and this category could, if it were permitted to do so, be greatly expanded in the future. However, the aura of uncertainty which surrounds all the independents' operations unfortunately applies also to this category. Most of the permits granted to the independents for inclusive tours are of short-term duration only, and this type of service is capable of being "snuffed-out" by the scheduled operators at any time if the latter get together and decide they would like to take over this type of business.

As for "normal" scheduled services not reserved to the Air Corporations, obviously the Corporations had already taken up all of the most promising routes. Although a few such scheduled services have been started, it is unlikely that there will now be other than a very small number taken up by independents—particularly in view of the ambiguous "no material diversion of traffic" proviso.

All-freight services, are, of course, highly speculative and long-term, as aircraft are not yet available which will enable large quantities of cargo to be carried over long distances at economic rates, and this economic handicap is further enhanced by the restrictions the Government apply to such services by independent operators. As an example, they are not allowed to carry United Kingdom air mail. Even so, certain operators have persisted with the development of all-freight services with some measure of success and, provided that governments and IATA recognize that very different rules and regulations are required for such services, as opposed to "passenger and supplementary freight" services, there are some prospects that in due course scheduled all-freight operations on an economic basis will be possible.

Plenty of Room

Assuming that there is a genuine desire to allow the independents a place in the sun, the questions now are what that place should be, and whether the finance necessary for new aircraft will be forthcoming. If one could keep politics out of, or nearly out of, this industry then these questions would not be very difficult to answer. With the vast expansion that could lie ahead there would be plenty of room to allow the independents a vertical share of traffic which would keep their resources fully occupied; and at the same time there would be adequate opportunities for the Corporations to expand and to start earning sound returns on the very substantial public capital that has been allocated to them since the war.

There is little doubt that if the great shipping companies could see a reasonably sensible policy being applied in the years ahead, they would be prepared progressively to invest more in the industry. How far these companies would be prepared to go probably depends on whether, as they took an increasing part in the industry, sounder economic policies were applied to international operations so that the economics of the industry became allied to the practices of the most economically efficient operators, and not to the policies of those operators who are supported by large subsidies from their Governments for prestige or other purposes.

The Realistic Approach

The shipping companies have every reason to be interested in the air transport industry and in seeing it run on a sound economic basis. Passenger traffic is increasingly transferring from the sea to the air but, judging from the statements by IATA about the poor profit margins of its members, it can hardly be said that it is because of low *profitable* air fares that this transfer is inevitable. It still has to be shown that the introduction of lower air fares, whilst taking revenue away from the shipping companies, creates profits for the air companies. There must obviously be more than a suspicion that only by subsidies in some form or other is this switch of traffic made possible.

Thus we have the strange situation that the great British shipping industry will be hit by competition from air transport—competition which, in many cases, has been stimulated by the use of huge capital and subsidies from public funds. Unfortunately only a proportion of the traffic lost to the British shipping companies is being transferred to the British air companies. It is the foreign operators who gain at the expense of the British transport industry—air and sea—as a whole.

The time is obviously long overdue for a new look at the whole situation from a national point of view. That is, from the point of view of *net* economic benefit to the country. If such a review indicates that there should be some independent participation in the air transport industry, then how that participation should be achieved must be worked out from cold, practical, factual, economic calculations. It cannot be based on a lot of political platitudes and a forlorn hope that, if no action is taken at all, it may "all work out right in the end."

Background to BIATA

The secretary of the British Independent Air Transport Association, MR. A. M. BLAKEMORE, *explains its work.*

THE revival of civil air transport in the United Kingdom immediately after the War brought about, amongst many other things, the need for a trade association to represent the interests of the private air transport companies which had come into being. Thus, in 1946, the British Air Charter Association was formed by 13 of those companies. The Association's aim, was, in the words of its Articles of Association, to "encourage, promote and protect the general interests of companies, firms and persons engaged in the air transport industry, but independent of the personal interests of any company, firm or person."

As the title of this new Association indicated, its members were operators engaged in the development of air charter—which, at that time, was the sphere of activity allocated to private enterprise under the Acts of 1946. It might be of interest to recall the substantial number of companies formed in those years, with high hopes and a great deal of enthusiasm, mainly by groups of ex-Servicemen who foresaw the post-War demands for air transport and bought Government-surplus aircraft in order to play a part. For the large majority, however, this was not to be and by 1950 the number of private operators had been reduced to 24 from a peak of 69 in 1947.

So far as the Association was concerned, its membership grew and fell with these changing circumstances from the original 13 (of which eight are still in membership) to 39 in 1948 and back to 20 in 1950. A very brief traffic survey of that period shows that charter passengers totalled 63,000 in 1946, 119,000 in 1947, 148,000 in 1948, 210,000 in 1949 and 196,000 in 1950. The aircraft fleet in that period consisted almost entirely of light and heavy twin-engined aircraft—in 1950 only 12 four-engined aircraft were in use.

By 1951 the scope and characteristics of the operations of the private companies had undergone considerable change and the title of their Association was no longer appropriate. It therefore assumed its present title in that year.

The present membership of the Association is 17 operator members (some of whom represent more than one company) together with 31 affiliate members, which are non-operating companies with an interest in, or affiliation with, the air transport industry. The operator members have wide and varied interests in all sections of air transport.

The Association is governed and directed by a Council which consists of the chairmen or managing directors of the operator members. The officers of the Association (chairman, vice-chairman and treasurer) are elected by the Council, normally for a term of a year. A full-time secretary and staff are employed on the work of the Association.

The Council of the Association meets at least once a month and, in the main, determines the broad policies to be followed on the issues before it. The Council is assisted in the more detailed work by committees concerned with three important aspects of operations—technical, operational and commercial. The chairmen of the committees are normally members of the Council in order that a direct link with the Council is maintained—the secretary acts as secretary of these committees as well as of the Council. The members of the committees are the appropriate company executives for each particular subject.

A survey of the work and activities of the Association in any period produces a very broad picture and, indeed, it is the intention that collective consideration and effort should be devoted to *all* spheres of activity within the industry. To some extent, a number of matters handled are of a domestic nature within the membership of the Association (e.g., handling and other arrangements at airports), but the main function of the Association concerns collective representation with other bodies or organizations. Such representation is largely devoted to governmental affairs (Ministry of Transport and Civil Aviation, Ministry of Supply, Air Registration Board, and so on), but the Association also acts on behalf of its members with other non-State organizations similar to itself. The secretariat is also indirectly involved in the important sphere of industrial relations on behalf of member companies.

At a very early stage it was obviously recognized that air transport development would, to a substantial extent, be dependent upon policies and agreements established in the international field and, therefore, the British and French independent associations formed the Fédération Internationale des Transports Aériens Privés in 1947 to represent their interests internationally. This organization, with headquarters in Paris, is recognized by ICAO for all purposes and today has 60 members in 12 countries.

To summarize. The British Independent Air Transport Association serves as a forum for deliberation on all questions affecting the air transport industry and, by collective action and representation, seeks to establish the best possible circumstances for the maximum safe, efficient and commercial expansion of its members.

SEVEN YEARS OF PROGRESS BY BIATA MEMBER OPERATORS

	1950–51	1951–52	% Change	1952–53	% Change	1953–54	% Change	1954–55	% Change	1955–56	% Change	1956–57	% Change
Scheduled Services													
Capacity ton-miles	2,499,000	4,035,000	+ 61·5	7,214,000	+ 78	14,209,000	+ 96	22,327,000	+ 57	36,710,000	+ 73	35,238,000	— 5
Load ton-miles	1,356,000	2,354,000	+ 72·8	4,526,000	+ 92	8,400,000	+ 85	12,897,000	+ 53	21,665,000	+ 70	21,934,000	+ 2
Overall Load Factor	54%	58·4%	—	62.7%	—	59.1%	—	57.8%	—	57.1%	—	62.2%	—
Passengers carried	55,512	74,426	+ 32	149,259	+100	267,255	+ 78	376,489	+ 40	565,219	+ 50	690,859	+ 22
Passenger-miles	10,732,000	14,598,000	+ 36	35,224,000	+135	64,269,000	+ 82	95,180,000	+ 48	127,900,000	+ 34	163,231,000	+ 27
Freight (short tons)	8,700	18,604	+ 11·4	20,852	+ 12	40,609	+ 92	59,185	+ 45	85,069	+ 43	68,972	— 18
Freight ton-miles	439,800	941,000	+110	1,240,000	+ 31	2,454,000	+ 97	4,082,000	+ 66	10,100,000	+149	6,944,000	— 33
Mail (short tons)	13	15	+ 15	22	+ 46	34	+ 54	54	+ 41	42	— 12	70	+ 70
Mail ton-miles	9,300	11,400	+ 21	15,140	+ 36	23,000	+ 53	48,000	+108	39,000	— 18	51,000	+ 30
Aircraft miles	1,630,000	1,808,000	+ 11	3,173,000	+ 78	5,297,000	+ 66	7,184,000	+ 35	11,250,000	+ 56	11,739,000	+ 4
Inclusive Tours													
Capacity ton-miles	—	—	—	—	—	868,000	—	1,931,000	+122	3,254,000	+ 79	7,469,000	+110
Passengers	—	—	—	—	—	12,166	—	27,581	+126	51,863	+ 87	108,434	+108
Passenger-miles	—	—	—	—	—	8,257,000	—	18,188,000	+120	30,581,000	+ 68	67,021,000	+111
Non-Scheduled Services													
Capacity ton-miles available	17,994,000	26,414,000	+ 47	57,994,000	+119	72,519,000	+ 25	100,275,000	+ 39	117,922,000	+ 17	111,656,000	— 5
Load ton-miles performed	8,888,000	17,714,000	+104	38,239,000	+116	49,897,000	+ 31	65,510,000	+ 32	89,123,000	+ 35	89,024,000	—
Passengers carried: Civil	46,699	21,471	— 53·8	87,299	+304	74,959	— 14	66,043	— 11	258,713	+291	322,538	+ 24
Military	4,926	53,786	+998	88,285	+ 64	147,825	+ 68	214,594	+ 44	204,700	— 4	157,035	— 22
Total	51,625	75,257	+ 44·3	175,584	+133	222,784	+ 27	280,637	+ 25	963,413	+ 65	479,573	+ 4
Passenger-miles: Civil	N.A.	30,303,000	—	36,731,000	+ 21	77,895,000	+ 82	90,509,000	+ 13	126,690,000	+ 39	144,044,000	+ 13
Military	N.A.	109,120,000	—	192,500,000	+ 77	315,607,000	+ 64	386,547,000	+ 19	522,903,000	+ 34	516,302,000	—
Total	68,558,000	139,423,000	+103	229,231,000	+ 65	393,502,000	+ 72	477,055,000	+ 22	649,593,000	+ 35	660,346,000	+ 2
Freight (short tons)	5,415	15,211	+190	42,025	+170	33,983	— 19	35,095	+ 3	44,194	+ 26	54,895	+ 24
Freight ton-miles	2,820,000	5,610,000	+ 95·3	16,137,000	+178	14,142,000	— 13	19,951,000	+ 43	29,891,000	+ 50	29,980,000	—
Aircraft miles	4,513,000	7,553,000	+ 67	11,099,000	+ 48	14,774,000	+ 33	19,344,000	+ 30	20,138,000	+ 4	19,183,000	— 5

The Independent Operators

Air Charter, Ltd.—2 Wigmore Street, London, W.1, and Southend Airport, Southend, Essex.

This company was acquired by Aviation Traders, Ltd., in 1952 and became the latter's operating company, with maintenance being done by Aviation Traders (Engineering), Ltd. With a fleet of three DC-4s, six Avro Super Traders (Tudor passenger/freighters), six Bristol Freighter Mk. 32s and three Mk. 31s, Air Charter operate specific charters and have several regular services and commitments. These include the "Channel Air Bridge" scheduled vehicle service from Southend to Calais, Ostend (in conjunction with Sabena) and Rotterdam; Air Ministry trooping to Cyprus; a U.K.-to-Australia freight service; a summer passenger service from Berlin to Hanover, and a freight service over the same route.

In association with Atlas Air Services, Air Charter operates the Trukair service which provides for door-to-door freight delivery between principal cities in England and Belgium.

In January, 1958, Airwork acquired a substantial interest in the Air Charter and Aviation Traders group of companies, but Air Charter is continuing to operate as an independent unit.

EXECUTIVES: managing director, F. A. Laker; operations manager, E. N. Jennings; commercial manager, G. W. Forster; manager, Channel Air Bridge, D. A. Wybrow.

AIRCRAFT: Super Trader G-AGRG, G-AGRH, G-AHNI, G-AHNL, G-AHNM, G-AHNO; Freighter 31 G-AMLP, G-AMSA, G-AMNF; Freighter 32 G-ANVR, G-ANVS, G-AOUU, G-AOUV, G-APAU, G-APAV; DC-4 G-ANYB, G-AOFW, G-AOXK.

Air Couriers (Transport), Ltd.—Croydon Airport, Surrey.

Air Couriers, Ltd., was founded in 1938 as an aircraft engineering and operating company—Air Couriers (Transport), Ltd., being formed after the War to take over the operating side. With a fleet of three Rapides, two Geminis and an Oxford, this general charter company now specializes in newspaper and television work (transporting films and cameramen), and aerial photography.

EXECUTIVES: managing director, F. W. Griffith; director, C. P. L. Godsal; chief engineer, K. J. Kelly; chief pilot and operations manager, Capt. F. W. Roffey.

AIRCRAFT: Oxford G-AHGU; Gemini G-AKFY, G-AKHV; Rapide G-AKNY, G-ALBI, G-APBM.

Airlines (Jersey), Ltd.—*see Jersey Airlines.*

Airviews, Ltd.—Ringway Airport, Manchester, 22.

Airviews began operations in 1948 at Barton aerodrome, Manchester, with a three-seat Auster Autocrat for aerial photography and charter work (this original aircraft, converted to an Alpha, is still in use). In 1950 Airviews became a limited company and acquired a Rapide, and in 1951 moved to Ringway. The aerial photography business then began to develop; this consists mostly of photographing factories and works from the Auster.

In 1955, with two Rapides, a scheduled week-end service was started to Sandown, in the Isle of Wight, with Southampton as a request stop, and another service to Newquay ensued. The purchase of two more Rapides followed in 1956 and in 1957 a Dove replaced the Rapides on this route. Both these services operate from May to September, while an all-year mid-week service by Dove is operated from Manchester to Newcastle upon Tyne. Airviews hope, in due course, to introduce a mid-week service to Torquay and a daily one to Tees-side.

Considerable charter work is done, mostly carrying newspapers to Scotland, the Isle of Man and Belfast, and parties to race meetings. Pleasure flights are also run with Rapides. The company has three pilots and about 10 employees.

EXECUTIVES: directors, J. B. Martin and B. M. Martin; chief pilot, Capt. A. James. J. B. Martin is in charge of operations.

AIRCRAFT: Rapide G-AFRK, G-ALBA; Dove 1B G-AINF; Auster Alpha G-AGXN.

ABOUT THIS GUIDE

On this and following pages we have summarized the history and present activities of the various British independent air operators, with particulars of their executives and aircraft fleets. In addition to the recognized companies in this category, the scope has been widened to include more specialized operators who also undertake general charter flying when their equipment (including helicopters) is not otherwise engaged. Companies wholly engaged in such activities as aerial survey, photography and agricultural flying are not included.

Airways Union, Ltd.—The Airport, Weston-super-Mare.

With flying bases also at Exeter Airport and Plymouth Airport, Roborough, Airways Union is the direct descendant of the pre-War and immediately post-War Straight Corporation. This Corporation, founded by Mr. Whitney Straight, took over and operated airports and flying clubs in many areas of the U.K. and eventually also entered the airline field when Western Airways (remembered mainly for its Weston-Cardiff air ferry) became part of the organization. Airways Union was the company which handled the insurance and were the brokers for the Corporation, and took over the remaining post-War operations at Weston, Exeter and Plymouth.

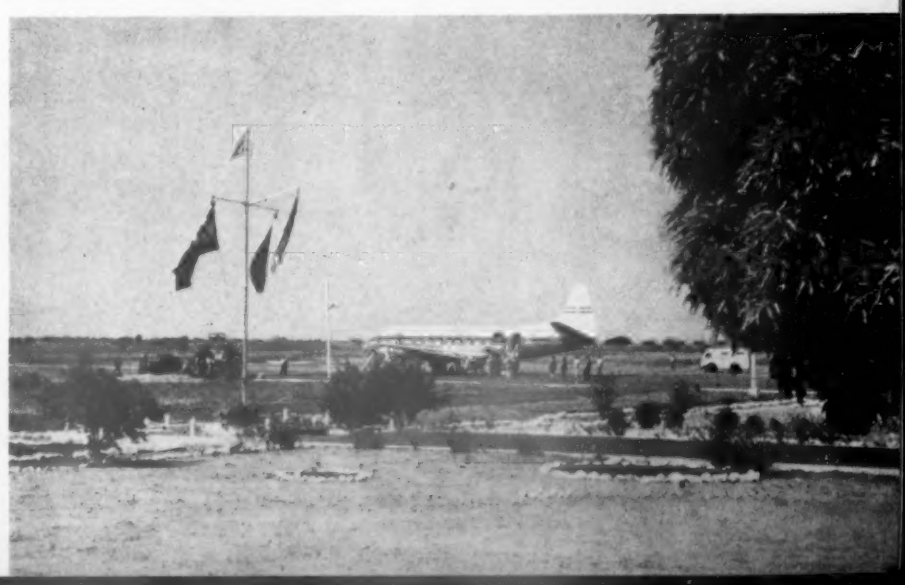
As an operating company Airways Union is primarily concerned with contract flying for the Government, and with club and school work, but as airport operators they are much involved with airline and charter work and, for instance, handle 15,000 passengers per annum for Jersey Airways at Exeter, as well as organizing charters to and from the areas in which they are operating. Apart from military-type aircraft, the Airways Union fleet is predominantly single-engined. Subsidiary companies include Western Airways, Ltd., Exeter Airport, Ltd., and Plymouth Airport, Ltd.

EXECUTIVES: directors: R. King-Farlow (chairman); S. J. Cox (general manager); F. G. Jeans; Wg. Cdr. R. J. B. Pearse (chief pilot).

Airwork, Ltd.—Airwork House, 35 Piccadilly, London, W.1.

Airwork was formed by Alan Muntz and Nigel Norman in 1928 when they started Heston Aerodrome as a flying centre, giving instruction and doing maintenance work. Their first charter was in 1933, when they flew a film of the Derby from Heston to Norwich. The first major overseas venture was the organization—in partnership with the Banque Misr—of the Egyptian National Airline, Misrair, originally known as Misr Airwork. Airwork also helped to develop Indian National Airways and Sudan Airways, and is still responsible for the technical management of the latter.

Peace-time trooping operations were



Early this year the first independent-operated intercontinental tourist service was started by Airwork and Hunting-Clan between London and Accra, Ghana. The Viscount flying on this inaugural Safari service is seen here at Bathurst, Gambia.

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started after the War (Airwork holds the largest trooping contract yet awarded), and operation of scheduled services began in 1952, in conjunction with Hunting-Clan, with the first Safari Colonial Coach flights to Kenya. Later, similar Viking services were introduced to Central and West Africa. All these services, including the tourist service to Ghana, are now operated with Viscounts.

Associated companies are Fison-Airwork, Ltd., and Air Charter, Ltd. (with other companies in the same group). Subsidiaries are Transair, Ltd. (which see), Airwork Services, Ltd. (for maintenance), Dishley Engineering Co., Ltd. (accessories and non-aviation engineering), and Straits Air Freight Express of New Zealand (which carries all the New Zealand Railways freight between North and South Islands). The four principal shareholders in Airwork are Furness, Withy and Co., Ltd. (about half the total); Blue Star Lines; the Whitehall Securities Group; and T. L. E. B. Guinness.

With a present fleet (excluding Transair and Fison-Airwork) of two Viscounts, three Hermes and five Vikings, Airwork operates the Safari services in conjunction with Hunting-Clan, trooping services to Singapore (with a shuttle service to Calcutta for the Ghurkas) operated in conjunction with Skyways, leave services for the Sudan Government, Cameroons Development Corporation and the Ghana Chamber of Mines, and winter services for the Ski Club of Great Britain. Charter work is also undertaken, and one of the Vikings is fitted out as a V.I.P. transport.

EXECUTIVES: president, T. L. E. B. Guinness, O.B.E.; chairman and managing director, M. D. N. Wyatt, C.B.E.; directors: R. L. Cumming (secretary); F. A. I. Muntz; O. B. S. Poole, C.B.E., T.D.; G. N. A. Murrant; B. R. Seton Winton; G. H. Trott, C.B.E.; R. C. Benbow; G. H. Freeman; P. B. Guinness. General manager, Air Transport Division, W. K. Davison; chief accountant, F. Bentley; general manager, Airwork Services, Ltd., R. W. Cantello; sales manager, L. R. Castlemaine; operations manager, G. E. Ford; general manager, technical, L. A. Lafone; traffic manager, K. R. Sangster; chief engineer, W. W. Warner; chief pilot, Capt. D. A. Woolfe.

AIRCRAFT: Viking 1A G-AHOP; Viking 1B G-AIXR, G-AJFT, G-AKTU, G-AKTV; Hermes 4 G-ALDA, G-ALDC, G-ALDG; Viscount 736 G-AODG, G-AODH.

Aquila Airways—B.A.S. group subsidiary company.

The only British flying-boat operator, Aquila flies scheduled services with three Solents from Southampton Marine Airport to Lisbon, Madeira, Genoa and Santa Margherita; maintenance is done at Hamble.

EXECUTIVES: chairman, Eoin C. Mekie, C.B.E.; directors, Malcolm Miller and Air Vice-Marshal S. D. Macdonald, C.B., C.B.E., D.F.C.; senior captain, Capt. P. Pearson; general manager, W. E. Hogsflesh; station and route manager, W. A. Strangways; chief engineer, S. E. Seymour.

AIRCRAFT: Solent 3 G-AHIN; Solent 4 G-ANYI, G-AOBL.

Aquila Airways is now the only British operator of flying-boats. In this unusual picture, one of Aquila's Solents (G-AOBL) is seen on Lake Geneva, with Montreux in the background.

Autair, Ltd.—75 Wigmore Street, London, W.1.

With three Bell 47 G2s and three Bell 47Ds, this helicopter company now operates exclusively abroad, on contract charter work such as pest control, aerial photography and geophysical surveys, and construction work, transporting men and material. It has about 30 personnel, with 10 pilots, and also provides staff and general facilities for an associate company in Canada which operates three Sikorsky S.51s.

Autair started operations in 1953 and

A Westland Widgeon of Bristow Helicopters flying beside the "Adma Enterprise" during the fitting-out of this oil-drilling rig in Das Island Harbour in the Persian Gulf. The vessel's helicopter platform can be seen just aft of the Widgeon's pontoons.

has worked for one season in the Arctic and two in the Antarctic with the Falkland Islands Dependencies Aerial Survey Expedition, using a Bell 47D equipped with floats and operating from the 900-ton M.V. "Oluf Sven." The firm also has bases in Calcutta and Nkana, Northern Rhodesia.

EXECUTIVES: chairman and managing director, W. H. Armstrong; director, D. M. Armstrong; chief pilot, Capt. L. R. Lord; chief engineer, Capt. Thomas Howie; commercial manager, E. Posey.

operations in Iran and is still continuing.

Both companies are private, independent companies controlled and owned by the board of directors. Bristow Helicopters at present employs 68 people, of whom 12 are pilots.

EXECUTIVES: directors, A. E. Bristow (managing); G. Russell-Fry, D.F.C., A.F.C., (finance); A. G. Green (operations); J. N. Woolley (engineering). Directors (Air Whaling), A. E. Bristow, G. Russell-Fry, J. C. Bristow.

AIRCRAFT: Widgeon G-AOZD, G-AOZE.

British Aviation Services, Ltd.—Silver City House, 62 Brompton Road, London, S.W.3.

One of the largest British independent air transport groups, B.A.S. now comprises Silver City Airways, Ltd., Britavia, Ltd., Aquila Airways, Ltd., Air Kruise, Ltd., Manx Airlines, Ltd., Manx Aero Engineering, Ltd., Lancashire Aircraft Corporation, Dragon Airways, Ltd., Roadair-Railair, Ltd., Silver Arrow, Ltd., and British Aviation Services (Engineering), Ltd. A majority holding is held by the P. and O. Shipping group, but represents only a very small part of P. and O.'s total assets. B.A.S. own, through the operating companies, 44 aircraft; the two main operating divisions are Silver City (short and medium range services) and Britavia (long-range services).

The group's policy appears to be one of expansion of established routes (generally where there is little air competition), and has involved the purchase of smaller companies to achieve that object. A major expansion of routes internationally

Left, is the first of B.K.S. Air Transport's ex-B.E.A. Elizabethans.

B.K.S. Air Transport, Ltd.—1 Marylebone High Street, London, W.1, and offices at 11 airports.

B.K.S.—the initials are derived from the names of the original directors—started operations in 1952. The company now operates passenger services throughout the year from Newcastle to Dublin, Edinburgh to Belfast, Leeds/Bradford to Belfast, the Channel Islands and Dusseldorf, and from Newcastle to Bergen, Basle, Southend, the Isle of Man and Leeds, and from Southend to Bilbao. Inclusive tours are flown from Southend to Corsica, Majorca, Portugal, Basle and Malaga.

The B.K.S. fleet consists of four DC-3s and one Elizabethan (with two more for delivery in the near future). Aerial survey work by B.K.S. Air Survey, Ltd., is undertaken with one of the DC-3s, a Consul and an Anson.

EXECUTIVES: managing director, C. J. Stevens; director, J. W. Barnby (vice versa in the survey company); chief pilot, Capt. H. W. Ayre; chief engineer, R. W. Johnson; commercial manager, A. Selby-Lowndes; secretary, J. Beer.

AIRCRAFT: Dakota 4 G-AMSF, G-AMSH, G-AMVC, G-ANAF; Elizabethan G-AMAD.

Two of Airview's aircraft, a Rapide and a Dove, on the apron at Ringway Airport, Manchester, the operator's base.

Bristow Helicopters, Ltd.—Henstridge Aerodrome, Henstridge, Templecombe, Somerset.

Bristow Helicopters was formed in 1955 and has engaged in the operation of Widgeon and Bell 47G helicopters for various oil companies throughout the World in connection with seismic, geological and gravity survey work. This work is still continuing, and it is anticipated that the company will enlarge its activities and introduce Sikorsky S.58 and S.55 helicopters into its fleet.

The associated company of Air Whaling, Ltd., was formed in 1953 to undertake the management and operation of helicopters for the whaling industry. In June, 1955, it undertook the management and operation of two Whirlwind helicopters belonging to the Shell Petroleum Co., Ltd., and operated them in the Persian Gulf in connection with the Shell company's exploration programme based on Doha. This work has more recently been extended to seismic

Britavia, Ltd.—B.A.S. group subsidiary company.

Using five Hermes, Britavia undertakes trooping operations to Malta, Cyprus, East and West Africa and the Far East. Inclusive tours are flown to Switzerland, Spain, Austria and Italy. Long-range charter work (nearly all passenger) is also done, including North Atlantic charters. Britavia also owns a travel agency with licences for all major air and steamship companies. The background history of Britavia and B.A.S. will be found under the British Aviation Services heading.

EXECUTIVES: chairman, Eoin C. Mekie, C.B.E.; directors, A. J. Mailland-Makgill-Crichton, General Sir Edwin L. Morris, K.C.B., O.B.E., M.C.; general manager, W. E. Hogsflesh; sales manager, R. P. Bennett; operations manager, P. F. Russell.

AIRCRAFT: Hermes 4 G-ALDI, G-ALDP, G-ALDU, G-ALDX, G-ALDM.

will perhaps follow after the continuous successful operation for some years of present services.

The history of the group started in 1945 with the formation of British Aviation Services, Ltd. In 1946 the Zinc Corporation formed Silver City Airways for the transportation of its men and materials with three Lancastrians and one DC-3. The unusual name was chosen because of the company's interests at the former silver-mining town of Broken Hill in New South Wales. British Aviation Services became managers of this company and when the mining group no longer needed Silver City Airways, B.A.S. purchased the entire shareholding.

On July 14, 1948, the cross-Channel Air Ferry service was inaugurated by Silver City with a hired Bristol Freighter, and was run initially on a charter basis from Lympne to Le Touquet. Licences

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for one, two and, in 1951, 10 years of scheduled operations were subsequently obtained, and since then traffic and routes have continued to grow at a remarkable pace. In 1952 Silver City ordered the three-car Bristol Superfreighter, designed to their own specification and for which they paid the design and development costs. In 1954 Ferryfield Airport was built at Lydd, specially to deal with the transport of vehicles, at a cost of about £500,000. In the same year control of B.A.S., Silver City's parent company, was acquired by the P. and O. group.

Manx Airlines, Ltd., was bought in May, 1956; Lancashire Aircraft Corporation in February, 1957; and Dragon Airways in July, 1957. These now form Silver City's Northern Division.

The group's fleet consists of three Solents, five Hermes, 14 Bristol 170 Mk. 32s, six Bristol 170 Mk. 21s, nine DC-3s, two Herons, three Rapides, a DC-2, a Dragonfly and a Consul (see also individual entries for the associated companies).

With regard to future plans, the Britavia side is interested in the Britannia, and more ex-B.O.A.C. Solents may be purchased for Aquila (there are about a dozen laid up). Replacement of the DC-3s and Freighters is not considered necessary for some time, but Silver City may well be interested in the Armstrong Whitworth A.W.650 freighter and A.W.670 car ferry or the Fairey Rotodyne.

EXECUTIVES: chairman, Eoin C. Mekie, C.B.E.; deputy managing director and general manager, Air Vice-Marshal S. D. Macdonald, C.B., C.B.E., D.F.C.; directors, Sir Donald F. Anderson, Air Commodore Sir Arthur Vere Harvey, C.B.E., M.P., General Sir Edwin E. L. Morris, K.C.B., O.B.E., M.C., and Sir Edward Wilshaw, K.C.M.G.

Cambrian Airways, Ltd.—Rhoose Airport, Cardiff, and 122 Wigmore Street, London, W.1.

This company originated in 1936 under the founder-shareholder and first managing director, Mr. S. Kenneth Davies, C.B.E. The first commercial operations began in 1946, between Cardiff and Bristol, and in 1949 a provisional licence (subsequently renewed) for a service to the Channel Islands was obtained. In 1957 this service alone carried 40,000 passengers, and in the present year Cambrian hope to carry more than 70,000 passengers in all.

Other services now operated are from Cardiff to Manchester (via Bristol) to connect with B.E.A. domestic services; to Belfast, and to Paris via Bristol and Southampton. The Channel Islands services operate from Bristol, Swansea, Liverpool and Manchester, in addition to Cardiff.

Herons have now replaced Doves on the services of Cambrian Airways, in which B.E.A. acquired a one-third interest last February. This operator's scheduled service network is centred on Cardiff.

On February 7, 1958, it was announced that B.E.A. had acquired a 33% interest in Cambrian, strengthening the close integration of routes and policy which already existed. In 1959 the company hopes to reopen the Nice-Dinard-London route, extending the London route to serve Swansea and Cardiff also.

EXECUTIVES: chairman, John H. Watts; joint managing directors, Wg. Cdr. L. B. Elwin, A.F.C., and W. M. Stanley, A.S.A.A. (secretary); directors, C. R. Cory, F. T. Dewey, A. M. C. Jenour, G. F. K. Morgan, Sir Arnold Overton, K.C.B., K.C.M.G., C.M.G., M.C., Phillip C. F. Lawton, D.F.C., Charles Hughesdon and John Morgan. Chief pilot, Capt. G. Perrett, D.F.C.

AIRCRAFT: Rapide G-AJCL; Dakota 4 G-AMSW, G-AMSX; Heron 2 G-AOGO, G-AOGU, G-AORJ.

Channel Airways (East Anglian Flying Services, Ltd.)—The Airport, Southend-on-Sea, Essex.

With a fleet of two Bristol 170s, five Doves (temporarily four) and two Rapides, this company operates a round-the-year service from Southend to Rotterdam and seasonal services from Southend (with spurs to Rochester and to Ipswich Airport, which East Anglian owns) to Ostend, Le Touquet, Jersey, Guernsey. On April 2 this year a coach-air service was started from Southend via Le Touquet to Paris. There are also seasonal services from Shoreham and Portsmouth to the Channel Islands—indeed, these summer services to the Channel Islands are the backbone of the company's business.

Channel Airways hope in the future to buy Vikings and Ambassadors, and if they can obtain approval for a car-ferry service to the Continent might also consider using Beverleys.

Some 30,000 passengers were carried last year on scheduled services; the staff number about 60, with nine pilots. The company was formed in 1946 for charter work and the first scheduled service started in 1947. In 1954 Channel Airways gave a guarantee that they would provide a service to Rotterdam if the authorities re-established the airport.

General charter work is also undertaken, including considerable freight carriage to and from Rotterdam—goods such as meat and lettuce, and cigarette-manufacturing machinery.

EXECUTIVES: managing director, Sqn. Ldr. R. J. Jones, A.F.C.; directors, P. H. Pike, H. A. M. Pascoe and A. E. Hugo Parsons. Operations manager and chief pilot, S. M. P. Walsh; chief engineer, T. Atkins.

AIRCRAFT: Rapide G-AEMH, G-AKRN; Freighter 21 G-AICT, G-AIFO; Dove 1B G-ANVU, G-AOBZ, G-AOCE, G-AOZW, G-APAG.

Continental Air Services, Ltd.—29 Hill Street, St. Helier, Jersey, and Rotterdam Airport, Rotterdam.

Founded in 1957 to undertake inclusive tours and general passenger and freight charters, this company is registered in Jersey but is based for the time being at Rotterdam. Its two Vikings are on time charter to a major Dutch shipping company; the purchase of additional Vikings

(*Continued on page* 541)

A comparative newcomer among British independents, Continental Air Services has two Vikings and undertakes general charter flying. No scheduled services are operated at present.

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(*Continued from page* 540)

and, perhaps, DC-4s is planned this year. Continental Engineering Services, Ltd., is an associated company.

EXECUTIVES: chairman, R. Myhill; managing director, I. J. Maclean; directors, Capt. V. H. Jeffries (operations director and chief pilot), G. Richardson (technical).

AIRCRAFT: Viking 1B G-AIKN and G-AJJN.

One of the rarer types of aircraft used by a British independent is the Handley Page Marathon, of which Derby Aviation use three on scheduled services.

Dan-Air Services, Ltd.—36-38 New Broad Street, London, E.C.2, and Blackbushe Airport, Camberley, Surrey.

Formed in March, 1953, with two DC-3s, this privately owned general-charter company now has five Yorks, two Bristol Freighters and two DC-3s. Operations are mainly concerned with freight transport, including an Air Ministry London-Singapore contract; some inclusive tours are flown. There are 200 personnel, including about 45 aircrew.

EXECUTIVES: directors, F. E. F. Newman, D.F.C., J. W. Davies, E. O. Wallis. General manager, L. E. Moore; chief engineer, B. V. S. Williams; secretary, D. R. Silburn.

AIRCRAFT: Dakota 4 G-AMSS, G-AMSU; Freighter 21 G-AINL; Freighter 31 G-APLH; York G-AMUT, G-AMUV, G-ANTI, G-ANTK, G-ANXN.

Derby Aviation, Ltd.—Derby Airport, Burnaston, Derby, and 78 Buckingham Gate, London, S.W.1.

With a fleet of three DC-3s and three Marathons, Derby Aviation run scheduled services to Jersey, the Isle of Man, Ostend, Antwerp (via Birmingham) and Glasgow, and seasonal inclusive tours to Austria, Switzerland, the Mediterranean, Majorca and the Costa Brava, and also fly general freight and passenger charters. A scheduled service from Oxford to Jersey is to start this year. The company was formed in 1949. A subsidiary, Derby Aero Survey, Ltd., operates two Ansons and three Austers from Elstree Aerodrome, which the company owns.

EXECUTIVES: chairman, Gp. Capt. C. A. B. Wilcock, O.B.E., A.F.C., A.F.R.Ae.S., M.P.; joint managing directors, Wg. Cdr. H. A. Roxburgh, A.F.C., A.F.R.Ae.S., and R. R. Paine; directors, Mrs. J. Harben-Grice; E. W. Phillips, O.B.E., and D. W. T. Sullivan. Chief pilot, E. W. A. Lines; traffic manager, D. Aldridge; secretary, M. Ager.

AIRCRAFT: Dakota 4 G-ANTD, G-AOGZ, G-APBC; Marathon G-AMEW, G-AMGW, G-AMHR.

Don Everall Aviation, Ltd.—Elmdon Airport, Birmingham (Head Office), and Wolverhampton Airport, Pendeford, Wolverhampton.

With three Rapides and one Dakota Don Everall operate week-end scheduled services between May and September from Birmingham and Coventry to Jersey. The service to Sandown, in the Isle of Wight, has been temporarily suspended due to the condition of the airfield there. Inclusive tours are flown to Basle, Lyons (for a coach/air service to Nice), Perpignan for the Costa Brava, and Zagreb for the Dalmatian coast. The Dakota is used for all this work, the Rapides being used for occasional charters; acquisition of a second Dakota is planned this year. General charter work occupies the company during the winter.

The company is privately owned and was formed at Wolverhampton seven years ago with a Rapide and an Auster. After a year it moved to Elmdon and started scheduled services at about the same time. There are five pilots and about 26 employees. Don Everall also run Wolverhampton Airport, on lease from the Corporation, and the local flying club.

EXECUTIVES: directors, Don Everall and Cliff Everall; operations manager and chief pilot, Capt. A. D. Atkinson; airport manager, Wolverhampton, and chief engineer, E. Holden.

AIRCRAFT: Rapide G-AGDP, G-AHPT, G-AKZO; Dakota 4 G-ANEG.

Eagle Aviation, Ltd., and Eagle Airways, Ltd.—Marble Arch House, 40 Edgware Road, London, W.2.

Eagle Aviation was started by Mr. Harold Bamberg in April, 1948, with a converted Halifax used for charter work. Two more were bought in the same year and Eagle played a major part in the Berlin Airlift, carrying 7,304 tons of cargo in 1,054 flights. Late in 1949 three Yorks were purchased and converted to 45-seat passenger/freight aircraft; three more were later added. In 1952, when the independents were first allowed to run scheduled services, the company decided to concentrate on these, after replacing the Yorks with Vikings and DC-3s. Eagle's first scheduled service, to Jugoslavia, started in the spring of 1953, and in that year Eagle Airways, Ltd., was formed to undertake the scheduled services, which have steadily expanded.

Eagle currently have two Viscount 805s (with an option on three more, though they have no immediate plans to take these up) and 17 Vikings. Two more Vikings are owned by an associated company, First Air Trading Co., and are leased to Eagle Aviation. To a greater extent, perhaps, than the other British independents, Eagle have concentrated upon international scheduled services, their scheduled route network of this kind being the largest behind B.O.A.C. and B.E.A.

An IATA member, Eagle Airways are this year operating Viscount services from London to Pisa, from Manchester to Hamburg, Copenhagen, Brussels and Frankfurt, and from Birmingham to Palma; and services with Vikings from London to Innsbruck, Luxembourg (with a coach service to Basle), Jersey, Dinard and Ostend, and from Manchester to Ostend. Provisional approval has been received for services from Manchester to

Eagle Airways put their two new Viscount 805s into use early this year on certain of their scheduled services between the U.K. and European cities. Hamburg, where this picture was taken, is one of the points served.

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Innsbruck and Pisa, London, Manchester and Glasgow to Reykjavik, Manchester to Stavanger, Bergen and Oslo, and Manchester to Nice.

Eagle Aviation, which is responsible for the non-scheduled work, operates the West African and Medair trooping contracts, the latter (with three Vikings based at Nicosia) between Tripoli, Malta, Benina, El Adem, Nicosia, Baghdad, Aden and Mombasa. Inclusive tour services are operated over about 20 routes and general charter work is also done.

On May 1 an associated company, known as Eagle Airways (Bermuda), Ltd., and operating under the title of Eagle International, will start a daily service between New York and Bermuda. Initially, Viscounts will be used—possibly one of Eagle Airways' 805s—and Montreal is also to be served in due course.

Eagle is entirely independent, having no connection with any other financial, shipping or aviation interests. The maintenance organization for the British companies is Eagle Aircraft Services, Ltd., with bases at Blackbushe and Manchester.

EXECUTIVES: **Eagle Aviation, Ltd.**—chairman and managing director, Harold Bamberg; deputy chairman, Maj.-Gen. C. G. B. Greaves; directors: Capt. J. H. Sauvage, D.S.O., D.F.C.; G. W. Pitt; P. C. F. Morgan, and N. Ashton Hill. Chief pilot, Capt. Harold Watkins; traffic superintendents, J. K. Maunder (London), Arnold Heard (Blackbushe); charter superintendent, T. Lucking.

Eagle Airways, Ltd.—chairman and managing director, Harold Bamberg; directors: Capt. J. H. Sauvage, D.S.O., D.F.C.; G. W. Pitt, and N. Ashton Hill. Commercial manager, J. T. Hutton; sales superintendent, J. Lovegrove; resident manager (Manchester), R. S. Allen.

AIRCRAFT: Viking 1 G-AGRS, G-AGRT, G-AHOZ, G-AHPF, G-AHPH, G-AHPM; Viking 1B G-AIHA, G-AIVH, G-AIVL, G-AIVO, G-AJBW, G-AJCD, G-AJPH, G-AKBH, G-AMGG, G-AMGI, G-AMNX; Viscount 805 G-APDW, G-APDX; Viking 1B (First Air Trading Co., Ltd.) G-AJBN, G-AJBP.

East Anglian Flying Services, Ltd.—*see Channel Airways.*

Fairey Air Surveys, Ltd.—24 Bruton Street, London, W.1, and White Waltham Aerodrome, Berkshire.

This subsidiary of the Fairey Aviation Co., Ltd., undertakes all kinds of survey work anywhere in the World, using three Dakotas. When these are not employed on survey work they are occasionally chartered for the carriage of freight. There are two associated companies, the Air Survey Co. of India (Pte), Ltd., and Aerosurveys, Ltd., of Vancouver; and two subsidiaries, the Fairey Air Survey Co. of Rhodesia and the Air Survey Co. of Pakistan, Ltd.

EXECUTIVES: chairman, Gp. Capt. F. C. V. Laws, C.B., C.B.E., F.R.P.S.; managing director, Col. R. T. L. Rogers, M.A., F.R.I.C.S.; directors, J. C. Macpherson, A.C.A.; Richard Fairey; W. P. Smith, M.B.E., B.A., F.R.I.C.S.

AIRCRAFT: Dakota 4 G-AHCT, G-ALWC, G-AMCA.

Above, a special transporter unit used by Helicopter Services, with an Agusta-Bell 47G landing on. Right, a Hunting-Clan Viscount at Nairobi's new airport at Embakasi.

Fison-Airwork, Ltd.—Bourn, Cambridge, and Airwork House, 35 Piccadilly, London, W.1.

Owned jointly by Fisons Pest Control, Ltd., and Airwork, Ltd., in equal proportions and formed in 1954, Fison-Airwork specializes in crop spraying, fertilizer spreading, power-line inspection and commercial helicopter operations throughout the World. Current activities include banana spraying overseas, survey work and transporting men and materials for Shell-B.P. in Nigeria and for Pakistan-Shell Oil Co., gas-pipeline maintenance and construction work in Pakistan. The aircraft fleet comprises five Whirlwinds and 19 Hillers, with two Twin Pioneers on order. A special licence from the M.T.C.A. permits helicopter operations below the normal minimum permitted heights.

The company has three overseas subsidiaries—Airspray (East Africa), Ltd. (four Piper Super Cubs); Union Crop-sprayers (Pty.), Ltd., of South Africa (five Super Cubs), and Agricultural Aviation (Pty.), Ltd., in Australia (four Tiger Moths). These subsidiaries undertake all types of spraying and air distribution work.

EXECUTIVES: chairman, M. D. N. Wyatt, C.B.E.; managing director, J. E. Harper, A.F.C.; directors, L. A. Lafone; G. E. Wildman-Lushington, C.B., C.B.E.; A. Wormald. Secretary, D. B. Peters, A.C.A.; operations manager, D. E. Bond; chief pilot, H. E. Johnson; manager, West Indies, R. G. Hill; chief inspector, J. W. Adams.

AIRCRAFT: Hiller 360 G-AMDN, G-AMDO, G-AMGY, G-AMMY, G-ANOA, G-ANOB, G-ANZM, G-AOZR, G-AOZS, G-AOZT, G-APDU, G-APDV, G-APJN, G-APKX, G-APKY, G-APLA; Westland S-55 G-AODO, G-AODP, G-AOYB, G-AOZK, G-APKC; Twin Pioneer G-APLM, G-APLN.

Left, one of Independent Air Travel's two DC-4s seen at the company's Hurn, Bournemouth, base.

Helicopter Services, Ltd.—96 Piccadilly, London, W.1, and Derby Airport, Burnaston, Derby.

Formed in July, 1955, under the chairmanship of Mr. David Brown (of the David Brown Corporation) with one Bell 47G, this company has spent some time experimenting to find the most practical use of the light helicopter in its present state of development, and has come to the conclusion that it is best employed transporting men and building materials to sites in difficult terrain. Typical tasks have been the movement of personnel and gear to triangulation points for the Ordnance Survey in the wilder parts of Scotland (enabling 18-20 points to be sited in two days); carrying sections of trial television masts for the G.P.O. and drilling equipment for a large building contractor; and following, from the air, the Butlins Channel swim.

The company's first overseas work, started recently, is the transportation of geologists in Libya. Other work undertaken is crop spraying, ambulance work (with two external stretcher panniers), aerial survey work and photography. Three Italian-built Bell 47Gs are used.

The company has four pilots and about 15 employees in all. Although associated with the David Brown Corporation, it is not a subsidiary of that organization.

EXECUTIVES: chairman, David Brown, M.I.Mech.E., A.F.R.Ae.S.; executive director, J. B. P. Williamson, F.C.A.; directors, A. D. Worton, A.C.A. (secretary), and T. M. Clutterbuck, D.F.C. (also chief pilot). Chief engineer, W. S. Nelson.

AIRCRAFT: Agusta-Bell 47G G-ANZX, G-AODI, G-AODJ.

Hunting-Clan Air Transport, Ltd.—London Airport, Hounslow, Middlesex, and 72 Wigmore Street, London, W.1.

One of the senior British independent companies, Hunting-Clan have a declared interest in becoming an accepted scheduled airline operator, and their present activities are all regarded as means to this end rather than as ends in themselves. The company's principal interest is in operations between the U.K. and Africa, linking with the widespread Hunting Group activities in Africa.

The company was formed at Luton as Hunting Air Travel in 1945, with Proctors, Ansons and Rapides, and the first operation took place on January 1, 1946. The early aircraft were replaced by Doves, then Vikings were purchased in 1947, followed by DC-3s and Yorks, and a move was made to Gatwick.

Huntings' early charter operations gradually spread farther afield; to the Channel Islands in 1947, to South Africa and back via West Africa, with charters from West Africa to Damascus in 1948. In 1951 Hunting operated some Aer Lingus' services under charter and in the same year they received the first bulk trooping charter, to Malta and Gibraltar.

The Northern Network of scheduled services was started under a B.E.A. Associate Agreement in 1953, and for a brief spell in 1954 Viscounts were used on the London-Newcastle portion of this network. These routes were sold (to Dragon Airways) in December, 1955. In 1952, with Airwork, the first Colonial Coach service, to East Africa, was started. Much early charter work in East Africa had laid the foundations for this and the company's interest in Africa was further emphasized by the introduction of the Africargo all-cargo service, in 1955. In that same year the Clan Shipping Line acquired an interest in Hunting's air transport operations, and the name was changed to Hunting-Clan Air Transport.

Today the Colonial Coach scheduled services (Safari) are operated in conjunction with Airwork from L.A.P. to Nairobi and Salisbury, and a joint tourist service to Accra was started this year. When the T.34 class services replace the Colonial Coach Safaris in two years' time Hunting-Clan and Airwork will together be permitted to offer 30% of the total tourist capacity on these routes.

The company's present operations, in addition to Safari services and the Colonial Coach to Gibraltar, include inclusive tours, contract charter work for large industrial and mining organizations, and crew training, particularly for airlines buying Viscounts. The fleet comprises three Viscounts, four Yorks, seven Vikings and three DC-3s (including two used by the associated Hunting Aerosurveys company). On order are two DC-6As, to replace Yorks on Africargo service, and two Britannias, which were ordered for Central African operations but will now probably be used on the existing services to Africa and for any other task which materializes.

The Hunting and Clan interests are represented by Hunting-Clan Air Holdings, Ltd., which was established as the holding company for Hunting-Clan Air Transport and certain other companies. These include Field Aircraft Services, Ltd., specialists in overhaul, repair and servicing, and aircraft sales, with associated companies in Rhodesia and South Africa; Fieldair, specialists in aircraft ferrying; Clanair and Northern Air Transport, Ltd., two non-operating companies; Central African Air Supply Co. (Pvt.), Ltd., and Hunting-Clan African Airways (Pvt.), Ltd.

Hunting-Clan African Airways, based in Rhodesia, operates freight and passenger services from Salisbury to Kariba, Abercorn and Nairobi (cargo only), besides a holiday service on the triangular route Salisbury-Vilanculos-Johannesburg-Salisbury, and inclusive tours. Two DC-3s are used for all these services.

EXECUTIVES: chairman, P. Ll. Hunting; managing director, M. H. Curtis; directors, Capt. L. B. Greensted, M.B.E. (technical); G. L. Hunting; C. P. M. Hunting; L. C. Hunting; the Hon. Anthony Cayzer; R. R. S. Cook; J. L. Smith; J. A. Thompson. Secretary, E. H. Baker; commercial manager, D. J. Platt; general sales manager, E. P. Hessey; chief pilot, Capt. R. W. L. Mulliner, D.F.C.

AIRCRAFT: Viking 1 G-AGRV, G-AGRW, G-AHPB, G-AHPC, G-AHPJ; Viking 1B G-AKBG, G-AMNK; Dakota 4 G-AMJH (and Hunting Aerosurveys: G-AMVB and G-AMYW); York 1 G-AMUS, G-AMUU, G-AMXM, G-ANGF; Viscount 732 G-ANRR, G-ANRS, G-ANRT.

Combined ground-air passenger services have been a recent feature of independent development. Here passengers are seen leaving Beauvais Airport on Skyway's Paris-London Coach-Air Service.

Independent Air Travel, Ltd.—Bournemouth (Hurn) Airport, Christchurch, Hants, and 84 Piccadilly, London, W.1.

Founded in 1951, but bought by its present owners in 1954, this charter and

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From Southend, Tradair, Ltd., operate two Vikings. The company was formed last November and has embarked upon a programme of inclusive tours and general charters.

maintenance company has a fleet of six Vikings, two DC-4s, one Beechcraft 18, and a Proctor. To this they hope to add a DC-6B before May or, alternatively, another DC-4. One of the larger privately-owned independents, the company has about 100 employees and will have 18 full crews (37 pilots) by May.

A wide variety of charters is undertaken, including many inclusive tours; the company hopes also to open a Colonial Skycoach service to British Guiana via the Bahamas, possibly using the DC-6B. About 50,000 passengers were carried last year.

EXECUTIVES: chairman and managing director, Capt. M. Kozubski; directors, Capt. T. E. Langton, Capt. A. Nicoll, D. M. Ebbutt (technical); general manager, Gp. Capt. J. A. MacDonald; sales and commercial manager, David Corsellis; operations manager, Capt. F. Lloyd; chief pilot, Capt. P. Sousta.

AIRCRAFT: Proctor G-AKWJ; Viking 1 G-AHPG, G-AHPR, G-AIJE; Viking 1B, G-AJBU, G-AJCE, G-AMNR; Beech C18S, G-APBX; DC-4, G-APCW, G-APID.

Jersey Airlines—The Airport, St. Peter, Jersey, Channel Islands.

The senior local operator in the Channel Islands, Jersey Airlines—or Airlines (Jersey), Ltd., to use its registered title—was formed in 1949 by the present managing director and has expanded steadily since. The company now concentrates upon scheduled services, linking the Channel Islands with the British mainland and with France, and running inter-island services.

A fleet of seven Herons is used for most of the services, including those to and from Exeter, London (Croydon), Southampton, Bournemouth, Manchester, Paris, St. Brieux and Bilbao, some of these services being seasonal. A single Bristol 170 Wayfarer maintains the service from Jersey to Dinard and a Rapide has recently been acquired for the inter-island services. In 1957 Jersey Airlines employed about 250 people, including 18 captains.

EXECUTIVES: managing director, M. L. Thomas; secretary, J. S. Cunningham; operations director, Capt. B. W. Gardiner; traffic manager, H. I. Allan; chief engineer, T. C. Chandler.

AIRCRAFT: Heron 1 G-ALZL, G-AMYU, G-AMLN, G-ANSZ, G-ANWZ; Heron 2 G-AORG, G-AORH; Wayfarer G-AMLL; Rapide G-AGSH.

Luton Airways—Luton Airport, Beds.

Formed earlier this year, Luton Airways intends to specialize in providing charter aircraft facilities for business and executive travellers. Present equipment comprises a single Dragon Rapide.

Manx Airlines, Ltd.—Ronaldsway Airport, Isle of Man. B.A.S. Group subsidiary company.

This company was formed as Manx Air Charter in 1947 with one Rapide; in the first six months of operation two more were acquired. In 1950 a summer scheduled service was started between Ronaldsway and Carlisle, and in 1953 services from Ronaldsway to Renfrew and Newcastle were introduced. The company's name was changed to Manx Airlines, Ltd., and it was acquired by B.A.S. in 1956.

Services are now operated from Carlisle, Newcastle, Belfast (Nutts Corner) and Glasgow (Renfrew) to Ronaldsway; charter work is also undertaken. The regular services are undertaken as part of Silver City Northern Division operations.

EXECUTIVES: chairman, Eoin C. Mekie, C.B.E.; directors, G. S. Hankinson (managing); T. L. Vondy and Capt. G. H. Drummond.

AIRCRAFT: Rapide G-AKIF, G-AKSE; Bristol 170 Mk. 21 G-AGVC, G-AIMH.

Morton Air Services, Ltd., and Olley Air Service, Ltd.—Croydon Airport, Surrey.

Morton Air Services was formed at Croydon Airport just after the War and began operating in January, 1946, with two Rapides and one small office. The company now has six Doves, one Heron, two Consuls and three Rapides, and has expanded accordingly.

Olley Air Service is one of the oldest independent airline operating companies in Europe, having started in 1933 with D.H. Dragons and, in conjunction with Aer Lingus, participated in the first scheduled air connection with Ireland, from Croydon to Dublin. The Olley company (after being largely owned for some years by British Railways) was acquired by Mortons in 1953, since when it has been run in conjunction with Mortons, although the famous name has been retained.

The principal activities today comprise scheduled summer services to Jersey and Le Touquet, and a service to Rotterdam throughout the year. A wide variety of charters are undertaken, specialities being executive transport, race-meeting charters, newspaper carrying, freight, and air ambulance work, for which special fittings have been made to enable stretchers to be carried in the Doves. One of the largest tasks undertaken by Mortons was the provision of four aircraft, with crews and engineers, for the United Nations Palestine Truce Commission in 1948-49. In 10 months half a million miles were flown on courier and patrol services.

About 20,000 passengers are carried yearly; the staff is about 100 strong, with 14 captains. Servicing is handled by a subsidiary, Morton Engineering Services, Ltd.

EXECUTIVES (Morton Air Services): chairman and managing director, T. W. Morton; director and secretary, E. V. W. Morton. Commercial manager, P. L. Eskell; operations manager and chief pilot, Capt. T. J. Gunn, D.F.C.; sales manager, C. W. Evans.

EXECUTIVES (Olley Air Service): as Mortons with the addition of J. J. Fargher on the board, and with S. A. Carter as secretary and commercial manager.

AIRCRAFT: Rapide G-AGUG, G-AGWP, G-ALBH; Consul G-AIAH, G-AIOS; Dove G-AJBI, G-AJDP, G-AKJR, G-AKST, G-AMYO, G-ANAN; Heron 1B G-AOXL.

Orion Airways, Ltd.—Blackbushe Airport, Camberley, Surrey, and Coventry Airport, Baginton, Warwickshire.

This is a small, general charter company (five pilots and about 13 employees) with one Viking, to which it is hoped to add a DC-4 this summer. It was formed in the spring of 1956 with a subsidiary maintenance organization, Orion Aircraft Services, Ltd., situated at Coventry Airport.

EXECUTIVES: chairman and managing director, Capt. P. E. Palmer; directors, Capt. P. A. Wilson, A. V. Donati, P. Cross and B. F. Biddle (technical).

AIRCRAFT: Viking 1 G-AHOS.

Overseas Air Transport (Jersey), Ltd.—22 Broad Street, St. Helier, Jersey, C.I.

This company was registered in Jersey in January, 1957, to undertake general charters, ferrying and overseas deliveries. The present fleet comprises a single Heron which is on a 12-month charter to Cambrian Airways, Ltd., but it is planned to operate DC-3s or Herons on scheduled service and/or inclusive tours from Jersey, commencing in the spring of 1959.

EXECUTIVES: managing director and chief pilot, Lord Calthorpe; directors, A. G. Calthorpe; J. H. Hogg. Secretary, B. G. Lihou.

AIRCRAFT: Heron 1B, G-ANCI.

Overseas Aviation (C.I.), Ltd.—26 Hill Street, St. Helier, Jersey, and Zimmerweg 10, Frankfurt/Main, Germany.

This company started operations with two Vikings on March 1, 1958. Registered in Jersey, it has a technical base at Southend and maintains an office at Frankfurt, a large part of the company's business at present coming from Continental charters.

Two of the directors, Mr. Myhill and Mr. Dromgoole, were co-founders of the German charter company Lufttransport Union, but have been unable to maintain financial control of this company because of German regulations on capital holdings. Mr. Myhill is chairman of Continental Air Services (which see) and also owns Overseas Aviation, Ltd., which became well known on the Continent for its operations with three Sikorsky S-51s. The latter company now operates skywriting aircraft in Germany and also operates several light aircraft.

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Captains Ludbey and Stevens were previously with B.K.S. Air Transport, Ltd., and the new company has subcontracted all its maintenance to B.K.S. Engineering, Ltd. In the 1959 season Overseas Aviation (C.I.), Ltd., hopes to undertake inclusive tours for British agencies.

EXECUTIVES: directors, R. Myhill (chairman); B. A. Dromgoole (managing director); Capt. Ludbey (chief pilot); Capt. P. de Vere Stevens.

AIRCRAFT: Viking 1 G-AGRP, G-AHOU.

Scottish Airlines (Prestwick), Ltd.—Prestwick Airport, Ayrshire.

This company is the operating associate of Scottish Aviation, Ltd., Scotland's only aircraft designers and builders. It was founded in 1935 and now concentrates on general charter flying with two Yorks and a Dakota. A Twin Pioneer was delivered to the company in February and is now on charter in the Middle East.

EXECUTIVES: general manager, I. C. Grant; secretary, D. McConnell; technical manager, W. A. Wilkinson; flight captain, G. M. Merrifield.

AIRCRAFT: York G-ANVO, G-ANYA; Dakota G-AMPP; Twin Pioneer G-APIR.

Silver City Airways, Ltd.—Silver City House, 63 Brompton Road, London, S.W.3. B.A.S. Group subsidiary company.

Silver City operates vehicle ferry services with Bristol Freighters and Superfreighters from Ferryfield to Le Touquet, Ostend and Calais; and (seasonally) from Southampton to Cherbourg and Deauville. Silver City also operate a substantial volume of inclusive tour flights to almost every point in Europe. Air Kruise, Ltd., which was purchased by the B.A.S. group in 1954 and integrated with Silver City last autumn, were the pioneers in Britain of inclusive tour operations.

A scheduled passenger service from Blackpool to Ostend with DC-3s is to start on May 4 this year, and a Heron service from Blackpool to Belfast on May 23. Five new services from Newcastle (all with DC-3s) will also start in May: to Hamburg, Amsterdam, Brussels, Dusseldorf and Blackpool. The operation of these new routes follows the purchase by B.A.S. of Dragon Airways and the Lancashire Aircraft Corporation in 1957.

The Channel Islands and Isle of Man are served from both Leeds and Blackpool and there are further services to the Isle of Man from Blackpool and Birmingham.

EXECUTIVES: chairman, Eoin C. Mekie, C.B.E.; directors, Ian M. Hooper (deputy chairman), R. G. Grout, W. G. Franklin, Air Commodore Sir Arthur Vere Harvey, C.B.E., M.P., General Sir Edwin L. Morris, K.C.B., O.B.E., M.C., H. C. Kennard. General sales manager, L. R. Pavey; general traffic manager, L. McCracken; general manager, northern division, R. V. Baker.

AIRCRAFT: Dragonfly, G-AEWZ; Rapide G-AKOE; Consul G-AIUS; Dakota 3 G-AMJU, G-AMYV, G-AMYX, G-AMZB, G-ANLF, G-AOBN; Dakota 4 G-AMWV, G-AHAE; Freighter 31 G-AHJI, G-AIFM, G-AIFV, G-AIME; Freighter 32 G-AMWA, G-AMWB, G-AMWC, G-AMWD, G-AMWE, G-AMWF, G-ANWG, G-ANWH, G-ANWI, G-ANWJ, G-ANWK, G-ANWL, G-ANWM, G-ANWN; Heron 1B G-AOZM, G-AOZN.

Skyways, Ltd.—7 Berkeley Street, London, W.1.

This company has its roots in the Lancashire Aircraft Corporation, registered by Mr. Eric Rylands in 1942. Operations started in 1946, and in 1947-48 24 Yorks were bought from B.O.A.C., plus a further five from Eagle in 1952. In 1952 the firm of Skyways, Ltd., which was founded in 1929, was bought by L.A.C. and the organization was then rearranged to make Skyways the major company. Eventually (in December, 1956) the Lancashire Aircraft Corporation was sold to British Aviation Services (which see), its aircraft being retained by Skyways. In March, 1955, the Bibby Shipping Line acquired an interest in Skyways.

With a present fleet of eight Hermes, 13 Yorks, four DC-3s, one Rapide and an Auster (used for banner towing), Skyways operate scheduled services from London via Malta to Cyprus with the Hermes, and coach-air services with DC-3s on the routes London-Lympne-Beauvais-Paris, London-Lympne-Vichy and, starting this year, London-Lympne-Lyons-Nice and London-Lympne-Brussels (the latter for the 1958 season only). A freight service with the Yorks is run from London to Singapore under contract from B.O.A.C., and a scheduled animal air transport service runs from Stansted/Blackbushe to Beauvais, carrying mostly horses and some other livestock. There is also a scheduled freight service from London and Lympne to Beauvais. Future passenger services are contemplated from Lympne to Montpelier, Tours and Dijon. The Hermes are also used for trooping from Stansted to Singapore—a service shared with Airwork.

Skyways own Lympne Airport and their aircraft maintenance is done by an associated company, the Samlesbury Engineering Co.

EXECUTIVES: chairman, Sir Wavell Wakefield, M.P.; managing director, J. Eric Rylands. Directors: Charles F. Dickson, O.B.E.; Derek J. Bibby, M.C.; Leslie O. B. Harding. General manager (administration), J. M. Twiss; secretary, A. J. Henderson, F.C.I.S.; general manager (financial), E. Barker; general manager (commercial), H. P. Snelling; air-trooping executive, Air Cdre. Sydney W. Smith, O.B.E., head, public relations and asst. to managing director, Mrs. E. Whittaker; chief pilot, Capt. A. N. Marshall; operations manager, Capt. J. S. Michie.

AIRCRAFT: Auster 5 G-AKTF; Aiglet Trainer, G-ANWX; Rapide G-AGOJ; Dakota 4, G-AGYZ, G-AMSM, G-AMWW, G-AMWX; York G-AGJA, G-AGNM, G-AGNO, G-AGNT, G-AGNV, G-AGOB, G-AGSO, G-AHEY, G-AHFB, G-AHFE, G-AHFF, G-AHFG, G-AMGK; Hermes 4 G-ALDD, G-ALDE, G-ALDH, G-ALDL, G-ALDR, G-ALDS, G-ALDT, G-ALDY.

Starways, Ltd.—Speke Airport, Liverpool, 19.

Starways was formed in 1948; Messrs. F. H. and J. A. Wilson joined the concern in 1949 and obtained control of it in 1955. With three DC-3s and two DC-4s scheduled passenger services are now operated from London Airport to Liverpool and from Glasgow to Jersey. A considerable number of inclusive tours are flown; from Glasgow, Liverpool, Belfast and Manchester to Lourdes, from Liverpool to Biarritz, Santander, Bergen, Bilbao, Palma and Basle; from Glasgow to Palma, Bilbao, Bergen, Barcelona, Basle, San Sebastian and Santander. Charters are also undertaken.

EXECUTIVES: chairman, F. H. Wilson; director, J. A. Wilson. Chief pilot, Capt. G. K. Leigh; traffic manager, J. M. Kent.

AIRCRAFT: Dakota 4 G-AMPO, G-AMPY, G-AMSN; DC-4, G-APEZ, G-APIN.

Tradair, Ltd.—Southend Airport, Southend-on-Sea, Essex.

This company was registered in November, 1957, and has purchased two Vikings from Airwork, Ltd., with which

Transair Ltd., a wholly-owned subsidiary of Airwork, has been using its two Viscounts since last October on regular trooping flights to the Western Mediterranean.

Guide to the Independents . . . .

general charter flying and inclusive tours are being undertaken. A heavy programme of work has been contracted for the coming season to carry passengers from Southend to most of the popular European destinations.

Both Vikings have been modified by B.K.S. Engineering, Ltd., to have a large freight door. For passenger operations, one has a 36-seat high-density interior and the other seats 27 in a high degree of comfort.

EXECUTIVES: directors: Eric S. Hanks (commercial); L. N. Monnickendam (technical); Capt. J. L. T. Allen (chief pilot).

AIRCRAFT: Viking 1B, G-AJFR and G-AJFS.

Transair, Ltd.—Croydon Airport, Surrey.

Formed in 1947 as a general charter company, with two Consuls and the idea of specializing in passenger traffic, Transair soon turned to freighting. Ansons were purchased and in 1948 a contract was obtained to fly newspapers to Paris. The newspaper business proved especially profitable and has since been expanded greatly.

In September, 1956, Transair became a wholly-owned subsidiary of Airwork, Ltd., two of whose directors are now on the board. With a fleet of 12 DC-3s and two Viscount 804s (a third will soon be added) Transair now operate scheduled mail and newspaper services to Paris, the Channel Islands, Belgium, Dublin, Dusseldorf and Hanover; an Air Ministry trooping contract for servicemen and families to Malta, Benina, Idris and Gibraltar; a seasonal scheduled passenger service to Jersey; various internal German services under contract from B.E.A.; the scheduled Lagos/Dakar service on behalf of W.A.A., and inclusive tours. One of the Dakotas is maintained and operated for the Niarchos shipping company.

The Transair Viscounts have rearward-facing seats, a four-cot nursery and other special provisions for Service families. They operate from L.A.P., but when Gatwick is completed all services will be run from the new airport, where the company is building a maintenance base. Transair has about 350 employees and 50 aircrew.

EXECUTIVES: chairman and managing director, G. H. Freeman; directors: M. D. N. Wyatt, C.B.E.; R. L. Cumming; D. J. Grimes; Air Chief Marshal Sir Hugh Lloyd, G.B.E., K.C.B., M.C., D.F.C., LL.D.; C. Nunn; P. Williams, M.A., M.P. Operations manager, Capt. C. W. H. Bebb; chief pilot, Capt. S. G. Websper; chief engineer, D. L. Brooks; chief inspector, W. Richardson; commercial manager, H. S. Perren.

AIRCRAFT: Dakota 4, G-AMPZ, G-AMRA, G-AMSV, G-AMYJ, G-AMZD, G-AMZF, G-AMZG, G-ANTB, G-ANTC, G-AOUD; Dakota 5 G-AMZH; Viscount 804 G-AOXU, G-AOXV, G-APKG.

Travelair, Ltd.—115 Oxford Street, London, W.1.

Formed about two years ago as a subsidiary of an export/import company named Heliczer Brothers, Ltd., Travelair is mainly concerned with aircraft sales, but hopes to acquire two DC-3s and a Viking and to operate scheduled services. At present a Gemini and an Auster V are operated on a charter basis from Elstree.

EXECUTIVES: directors: E. Helitser, E. Hedley-Bray.

The Air Market of the Baltic Exchange

THE Baltic tradition goes back two centuries, to the time when merchants dealing in various commodities did business with ships' captains in a City coffee house. After the opening of the Suez Canal in 1858 the chartering of tramp steamers became progressively more important and by the end of the century this meeting of merchants and shipbrokers had grown to an association, 1,000-strong, occupying South Sea House in Threadneedle Street.

Aircraft charter began to develop in the post-World War II shipping shortage, though the first Air Charter Party (i.e., agreement), for a flight of cargo between Croydon and Cologne, was signed as long ago as 1928.

Business is done in the Air Market of the Baltic exchange between two types of broker, one representing business on offer, the other the aircraft operator. The broker's sole remuneration is commission on contracts concluded, provision for this being made in the carrier's standard rates; thus the charterer has the benefit of expert assistance at no additional cost. The charterer gets his aircraft space at the most competitive price, and can be sure no possible source has been overlooked; on the operator's side, the use of the Baltic Exchange means that a return load can often be found for a single-journey charter. Something like 60% of the aircraft chartered in this country are chartered through the Baltic Exchange.

The Airbrokers Association (formed in February, 1948) exists to promote business and establish uniformity in commercial transactions. Initially, 39 air transport operators were members: now there are 77 members.

The principal loads negotiated initially after the War were perishables such as fruit, flowers, cheese, etc., but charters have increasingly tended to be for passenger transport and bulkier cargo consignments. The carriage of ships' crews (together with marine machinery and equipment) are a mainstay of the business—not surprisingly in view of the alarming expense of recruiting crews weeks or months in advance, or of having a ship immobilized in a foreign port. Inclusive tours are a growing business.

Cargo business falls into well-defined groups: chemical products which must have swift transportation, avoiding extremes of temperature; heavy machinery such as spare parts (particularly marine); perishable goods such as flowers from the Mediterranean to the North of Europe; and newspapers. With the development of refrigerated surface transport the business in foodstuffs has declined, but the carriage of livestock, and the export of manufactured goods, which can be sent in cartons by air but which would need crating for surface transport, has grown.

The Baltic Exchange Air Market is of particular use to the independents, who generally have neither the staff nor the means (nor the fleet to offer) to set up a large sales organization. It is interesting to note that B.O.A.C. and B.E.A. are themselves members of the exchange and conduct their own business. In the last year there has been a marked increase in foreign representation in the market.

Undoubtedly the biggest restriction to greater expansion of the Air Market is the lack of any "freedom of the air" corresponding to the "freedom of the sea" and the restrictions imposed by Governments for the protection of their own national air carriers.

The Independents and their Brokers

Airviews, Ltd.	S.L.A., Ltd.
Airwork Ltd.	Furness Withy and Co. Ltd.
Aquila Airways Ltd.	Instone Air Transport, Ltd.
Autair Ltd.	James Burness (Travel) Ltd.
B.K.S. Air Transport, Ltd.	Lep Air Services, Ltd.
Britavia Ltd.	Instone Air Transport, Ltd.
Cambrian Airways Ltd.	Lambert Brothers, Ltd.
Dan-Air Services, Ltd.	Davies and Newman Ltd.
Derby Aviation, Ltd.	H. Clarkson, Ltd.
Don Everall Aviation, Ltd.	S.L.A., Ltd.
Eagle Aviation Ltd.	Lambert Brothers, Ltd.
East Anglian Flying Services Ltd.	Lep Air Services, Ltd.
Fairey Air Surveys Ltd.	H. Clarkson, Ltd.
Fison-Airwork Ltd.	Furness Withy and Co., Ltd.
Hunting-Clan Air Transport Ltd.	E. A. Gibson and Co., Ltd.
Manx Airlines Ltd.	Instone Air Transport, Ltd.
Morton Air Services Ltd.	Lanes (Aircharters), Ltd.
Olley Air Service Ltd.	Lambert Brothers, Ltd.
Orion Airways Ltd.	S.L.A., Ltd.
Scottish Aviation Ltd.	Brown Jenkinson and Co., Ltd.
Silver City Airways Ltd.	Instone Air Transport, Ltd.
Skyways Ltd.	E. A. Gibson and Co., Ltd.
Starways Ltd.	Lanes (Aircharters) Ltd.
Tradair, Ltd.	Atlas Air Express (Atexco), Ltd.

N.B. Transair and Air Charter, though accepting business, have not appointed Brokers.

THE FIGHTING SERVICES

Malayan Air Strikes

THE heaviest bombardment of the war against the Communist terrorists in the Malayan jungle has been completed during the past few weeks by R.A.F., R.A.A.F. and R.N.Z.A.F. aircraft. In round-the-clock attacks since March 17 they have dropped a total of 186 tons of bombs and fired 200 60-lb. rockets and 23,000 rounds of cannon shells over suspected Communist supply dumps and hide-outs in Perak State. This aerial campaign has been described as "a calculated war of nerves to harass the terrorists, deny them rest and contact with their supporters, and thereby induce them to surrender."

The R.A.A.F. Against Japan

IN some ways it is a pity that the second volume of the official history of the Royal Australian Air Force in the Second World War, "Air War Against Japan: 1943-45," by George Odgers, has appeared before the first volume, dealing with the opening phase of the Pacific war, has been published. The admirably written narrative begins in April, 1943, and the reader is bound to feel as though he is beginning to read a serial story half-way through, and is consequently somewhat hazy about what has gone before. The whole of the period covering the successful Japanese offensive on all fronts is not yet available and, of course, this important—and for the Allies disastrous—series of events set the stage for what was to follow.

In April, 1943, the Pacific war was entering its second phase, when the Allies had collected sufficient resources to allow them to take the offensive. There followed the slow but steady process of pushing the Japanese back, island by island, until the Allied heavy bombers could reach the mainland of Japan. The third and final phase then began, with a strategic air bombardment which, coupled with the destruction—mainly by aircraft—of Japanese sea power, brought about the collapse of their resistance. Their homeland was defended by an army of a million men, but invasion was unnecessary.

While the major partner in this brilliantly successful air war was the United States Air Force, the R.A.A.F. took part in almost all the air operations. Mainly they were scattered about in small numbers, and only in the South-West Pacific theatre did they have sizeable formations under their own senior commanders. In Burma the Australian airmen served in British squadrons, and some R.A.F. units engaged in that campaign had a high proportion of Australians on their strength.

The book gives a very full, detailed and objective account of the part played by the R.A.A.F. in the second and third phases of the Pacific war. The Australian airmen displayed a standard of gallantry and devotion to duty second to none in a conflict in which the normal dangers and hardships of war were increased by the appalling brutality of the Japanese towards Allied prisoners of war. Captured aircrews, even wounded men, were beaten up, flogged and questioned mercilessly for long periods. Some were even killed in cold blood at special ceremonies. They suffered all these outrages with dignity and great courage. In the prison camps they were systematically starved and over-worked, and a sadly small proportion eventually returned to their homes.

It is, however, only fair to say that individual Japanese did sometimes behave decently and even kindly. Wg. Cdr. L. V. Hudson records that when taken prisoner, after a crash in which he and his navigator were injured, they were kicked and beaten for hours, tied up and their wounds allowed to go septic. But later the Japanese officer in charge lent Hudson his overcoat, when they had a very cold journey by truck, and himself shivered all the way.

The book, once again, underlines the savagery and bitterness of the Pacific war. It is impossible to doubt that the fighting was at least as tough, the risks in some ways greater, and the hardships more cruel than anything our forces encountered in the war against Germany and Italy. The R.A.A.F. emerged from the conflict with its already fine reputation greatly enhanced, and with a record of which any Air Force could justly be proud.—ROBERT SAUNDBY.

Aircraft Crash Barrier

A SIX-MONTH test of the aircraft crash-barrier made of nylon installed at the end of the runway at R.A.F. Ahlhorn, 2nd T.A.F., which was briefly described in THE AEROPLANE of March 28, has now been completed.

The barrier itself consists of two steel cables, the top one supported on wooden booms, which are attached to hydraulic drums on each side of the runway. Between the cables triple strands of ½-in. nylon rope are suspended and spaced so as to grip the leading edges of an aircraft's wings but to pass clear of the nose and cockpit. The drums take up the tension as soon as the aircraft moves into the net, allow it to travel forward with the aircraft, and then apply a rapidly increasing drag effect. The manufacturers claim that a 9-ton jet aircraft contacting the net at 120 knots can be brought to rest in 120 yd.

R.A.F. Appointments

Wing Commanders: G. F. McMahon, D.F.M., to Headquarters, British Forces Arabian Peninsula, for Provost staff duties; P. W. Nunn, B.E.M., A.F.R.Ae.S., to R.A.F. Thorney Island, for technical duties; G. N. Street, O.B.E., to Air Ministry for duty in the Department of the Air Member for Supply and Organization; L. H. Styles, D.F.C., to Headquarters, 2nd T.A.F., for administrative staff duties; H. M. H. Tudor, D.F.C., A.F.C., to R.A.F. Staff College, Bracknell, for directing staff duties; G. Young, to R.A.F. St. Mawgan, for flying duties.

Squadron Leaders: C. L. C. Mason to Headquarters, 2nd T.A.F., administrative staff duties (with acting rank of Wg. Cdr.); F. Vernon, M.B.E., to Headquarters, No. 22 Group, for administrative staff duties (with acting rank of Wg. Cdr.).

ARMY ASPIRANT.—The second Edgar Percival EP.9 for the A.A.C. shows its military features, including underwing containers, extra side door and stretcher installation, at Stapleford Tawney.

Photographs copyright "The Aeroplane"

Why Helicopters?

The VTOL requirements for a short-haul air transport vehicle for city-centre/city-centre operations are here discussed by PETER W. BROOKS, B.Sc., A.C.G.I., A.F.R.Ae.S., *technical assistant to the chairman of British European Airways.*

THINKING PEOPLE in the airline business—and sometimes outside it—often ask why commercial air transport operators are interested in helicopters. The helicopter has so many obvious drawbacks as a vehicle for scheduled transport that there are good reasons for searching inquiries on this point. The helicopter is mechanically complicated, is too small for satisfactory use on scheduled services, is noisier and in other ways less attractive to passengers than the aeroplane, and—its most serious drawback—has unacceptably high operating costs.

Some of these objections should be overcome by further development, but the helicopter will remain mechanically complicated and is always likely to have higher operating costs than contemporary fixed-wing aircraft. Why then bother about it for airline work? Why not leave the helicopter to its obvious natural rôles—for air/sea rescue work, as a means of reaching inaccessible places and for the various other specialized military and civil purposes for which it is so well suited?

The answer is that the fixed-wing aeroplane has itself proved—and, in its present form, is likely to continue to be—a rather unsatisfactory vehicle for short-haul transport over distances of up to about 150 miles. Indeed, it is often criticized for its deficiencies on ranges of up to as much as 300 miles. Yet more than half B.E.A.'s passengers travel on stage lengths of 300 miles or less.

Aeroplanes must operate from aerodromes, and aerodromes, because of their size, must usually be sited considerable distances from the centres of the cities they serve. This does not matter for long-haul transport but, on all short journeys, it means that the time saved going by air will always be largely negatived by the laborious process of getting to and from airports. The development of rail-links and of high-speed roads may mitigate this disadvantage to some extent in the future but, even so, the loss of time and changes of vehicle will remain permanent major objections to aeroplane transport on short journeys.

We require on short hauls, where the saving even of minutes is the essence of the transport problem, a form of air transport which can go direct between convenient centres in the built-up areas which generate the traffic to be carried. There is thus a requirement for a vehicle which, unlike the aeroplane, can operate from such small areas that operating stations can be provided without too much difficulty in, or near, the centres of towns and cities.

This then is the nub of the problem: a city-centre vehicle is required which is fast enough to provide adequate punctuality in all wind conditions and to give a city-centre/city-centre journey quicker than that of the present-day combined operation by airport coach and aeroplane. At the same time, and this is equally important, the new vehicle must have operating costs which will make it competitive with other forms of transport taking into account the faster journey it will provide. Its flying characteristics should be such that it can provide standards of safety and of reliability by day and by night in all weathers which are, if possible, at least as good as those of the transport aeroplane of today.

To put some numbers to these various requirements, it seems that our new vehicle will require a cruising speed of at least 150 m.p.h. if it is to achieve reasonable punctuality. However, its speed should be higher if possible. Taking our lower limit of 150 m.p.h., even this speed will provide faster journeys on stages of up to 300 miles than an aeroplane which cruises at 600 m.p.h. but which is penalized—as is not unusual at present—by airport coach rides of an hour at each end of the journey. The comparative journey times for a 300-mile trip on the above assumptions would, in fact, be about 2½ hr. for the city-centre vehicle and about 3½ hr. for the aeroplane—a substantial time saving for the new vehicle and one which would be proportionately greater on shorter journeys.

To be competitive from the cost aspect, the new vehicle will probably have to achieve direct costs of between 2½d. and 4½d. per seat-mile, depending on the type of route operated. Its operating characteristics will have to be such that it can operate into city-centre sites in weather conditions comparable to present fixed-wing limits, which are of the order of a 250-ft. ceiling and a ½-mile visibility. At the same time it should offer safety standards at least equivalent to the transport aeroplane's present average level of about one fatality per 100,000,000 passenger-miles.

Can these exacting requirements be met? And if so, how and when?

The indications are that increases in size and improvements in performance over current helicopters of the order of those offered by the 40/50-passenger Fairey Rotodyne or the Westland Westminster will be necessary to achieve the operating costs which will be required. If the flying characteristics, mechanical reliability and external noise level of these larger helicopters can be brought to the standards which have been claimed it seems probable that the airlines' requirements in these directions also can be met, including the essential one of an adequate level of safety.

It has already been pointed out that nearly two-thirds of B.E.A.'s passengers travel on stage lengths of 300 miles or less. This proportion is not expected to alter to a significant extent in the foreseeable future. B.E.A. expects to be carrying about 10 million passengers a year by 1970, of which perhaps six million will be over distances appropriate to helicopter operations. If we assume that a modest quarter of these passengers would use helicopter services direct between city centres, if these can be provided at a fare level only slightly higher than current combined air and airport coach fares, this would mean

(*Continued on page* 549)

The Fairey Rotodyne—here seen flying in its latest form with the folding upper fins fitted—is to carry 40/50 passengers. It is powered by two 3,500-e.h.p. Napier Eland N.El.7 turboprops.

(*Continued from page* 548)

that something like a million B.E.A. passengers a year might fly by helicopter into and out of the London area by 1970.

A traffic flow of this order is equivalent to, say, 130 aircraft movements (arrivals and departures) on a peak summer day and perhaps 10 movements in a peak hour—figures equal to about half the B.E.A. peak aeroplane movements at London Airport last summer. To these movements must be added those by foreign airlines and by other operators.

It would appear from the above that there should not be any undue practical difficulties in providing adequate helicopter station capacity, even for London, even if helicopter services develop during the next decade on a scale appropriate to the traffic which is potentially available to them. Excessive traffic congestion can probably, in any case, be mitigated in the long term by dividing the traffic between a number of helicopter stations strategically sited throughout the built-up area and by keeping to minimum "turn-round" times.

The question of how long it will take to develop helicopter services on this scale has been the cause of much argument and misunderstanding in the past. One thing, however, is certain: all estimates of the development time of transport helicopters have so far proved grossly optimistic. Ever since the War the practical multi-engined transport helicopter has been "just round the corner." It still has not come into sight although it does now seem to be getting somewhat nearer. On present information it would appear possible that 40/50-passenger helicopters might be available in practical form by the early 1960s. However, it is doubtful that they will be ready by then for scheduled passenger operations.

An extensive background of operating experience—to prove reliability—will be absolutely essential before scheduled passenger services can be started. Just what this background must be has yet to be determined by airworthiness authorities. It will, in any case, be influenced to an important extent by the amount and character of the operating experience which has been gained with military vehicles of basically the same type by the time the particular civil aircraft comes along. Because of these problems, perhaps the mid-1960s would be a realistic estimate of the likely date of the first serious scheduled services with large, potentially economic helicopters.

Discussions about the use of helicopters by the airlines invariably come round in the end to the same ominous suggestion that helicopters are anyway rather a waste of time because, by the time the types needed for scheduled services are available, some simpler and more efficient form of vertical take-off and landing aircraft will have been developed. This

Top, the Transcendental Model 1-G, although not a new design, comes in the category of "tilt-rotor convertiplane" a basic type which the author considers as of possible city-centre application. (*Levy-Shipp photograph.*) The lower picture shows the Hiller Model 1048 project, which is in the "tilt-wing convertiplane" class. (*Howard Levy photograph.*)

Photograph copyright "The Aeroplane"

The Westland Westminster, a model of which is seen here, will seat 39 passengers in its commercial form. The engines are to be Napier Eland turboprops.

proposition is a serious one and must be examined very carefully in relation to the purpose for which the airlines need helicopters or some other form of city-centre vehicle.

The helicopter itself is, of course, only one of many types of VTOL aircraft. It must be judged alongside possible alternatives, taking into account the two factors of:—

(1) Relative suitability for the city-centre/city-centre job that the airlines want done; and

(2) The date by which other types of VTOL vehicle might be available to do the same job on a scheduled basis with fare-paying passengers.

First of all, let us consider the various categories of VTOL aircraft so far as details of these have been publicly revealed. The list gives the names of representative aircraft or projects in each category. The year of the first flight of the original practical vehicle is quoted (in brackets) in each case.

Possibly Suitable for City-centre Operations

(a) *"Pure" helicopter* (1936): All the many types of conventional helicopter with shaft- or tip-driven rotors are in this category.
(b) *"Compound" helicopter* (1953): S.O. 1310 Farfadet, Fairey Jet Gyrodyne, McDonnell XV-1, Fairey Rotodyne.
(c) *Fan-lift "flying platform"* (1955): Hiller, Piasecki, Aerophysics Development Corpn., Chrysler.
(d) *Fan-lift convertiplane* (projects only): Hiller, General Electric.
(e) *Tilt-fan convertiplane* (1958): Doak 16.
(f) *Tilt-wing convertiplane* (1957): Vertol 76, Hiller X-18.
(g) *Tilt-rotor convertiplane* (1954): Transcendental Model 1-G, Bell XV-3.
(h) *Deflected-slipstream flat-riser* (1958): Ryan Vertiplane, Aero X-1.

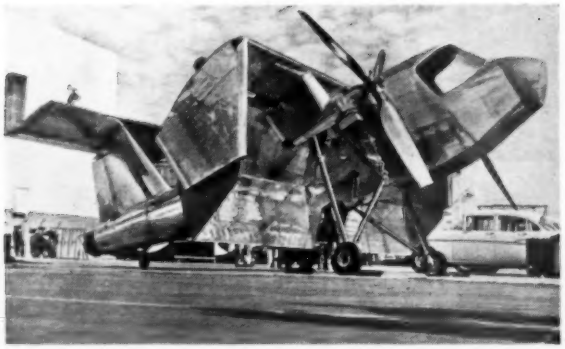
Probably Unsuitable for City-centre Operations

(i) *Jet-lift "flying platform"* (1953): Rolls-Royce "Flying Bedstead," Ryan, SNECMA "Atar Volant."
(j) *Jet-lift flat-riser* (1957): Short SC.1.
(k) *Tilt-jet flat-riser* (1955): Bell.
(l) *Deflected-jet flat-riser* (1957): Bell X-14.
(m) *Tail-sitter jet* (1957): Ryan X-13 Vertijet.
(n) *Tail-sitter turboprop* (1954): Convair XFY-1, Lockheed XFV-1.
(o) *Tail-sitter coleopter* (under construction): SNECMA C-450.

The above list is divided into the types of VTOL aircraft which are possibly suitable and probably unsuitable for city-centre operations. The sub-division has been based on the likely acceptability in built-up areas of the various vertical-lift systems.

Rotor or fan lift and that from deflected slipstreams hold out some prospects of being usable in heavily populated areas without creating such noise and blast disturbance as to rule out any chance of their acceptance by the public on the ground.

The same cannot be said of jet-lift. There seems to be little prospect that this system will ever have city-centre applications—its promise would appear to lie primarily in its application to high-speed aircraft which can benefit aerodynamically from jet-lift because their fixed surfaces will not need to be designed



This experimental "deflected slipstream flat-riser" is the Ryan Vertiplane; the endplate at each wing tip also acts as a flap guide. The type is powered by a single Lycoming T53 turbine driving two propellers.

to give the low-speed characteristics which would otherwise be essential.

The tail-sitters are unlikely to be suitable for transport applications because of the problems resulting from the change in attitude between cruising flight and take-off and landing.

The other significant conclusion to be drawn from the list is the lead of the "pure" helicopter along the development time-scale. The helicopter first emerged in practical form about 20 years before other types of VTOL aircraft. The "compound" helicopter derives directly from the original type and was, in any case, partly anticipated—so far as its auto-rotating unloaded rotor is concerned—by the Cierva Autogiro which first flew in 1923. As a result, although the "compound" helicopter first flew at only about the same time as some of the first of the later VTOL concepts, its development will certainly be more rapid than theirs. Indeed, this type can reasonably be expected to mature considerably sooner than the other VTOL systems and perhaps not much later than the "pure" helicopter itself.

The conclusion to be drawn from the above is that the helicopter, in "pure" and "compound" forms, has an important lead in time over all other possible types of city-centre vehicle. If the economic transport helicopter becomes available in the early 1960s, it can reasonably be expected to reach a sufficiently proven state for large-scale airline use by the middle 1960s.

The development of other forms of VTOL aircraft which might be suitable for short-haul air transport appears at present to be running about 20 years behind the helicopter. Some of these later systems may mature more rapidly than the helicopter, either because they are fundamentally simpler or because of the greater development effort being expended on them at an earlier stage. Even so, however, it seems likely that the helicopter will have a useful airline life of at least 15 years before there is any question of it being succeeded by some later system.

When the time does come, which type of VTOL aircraft seems most likely ultimately to replace the helicopter for airline use?

To find even a tentative answer to this difficult question, we must consider the main features of the various alternative VTOL systems which have already been judged to be the more suitable for city-centre operations. As we have seen, the alternatives appear to be some form of fan-lift, a tilt-wing (and propellers) or tilt-rotor system (where the rotors, in effect, become propellers in cruising flight), or a deflected-slipstream aircraft. As has already been said, the most serious objections to the helicopter, from the operator's point of view, are its mechanical complexity and its high operating cost.

It is at once apparent, however, that the various VTOL alternatives listed above do not necessarily offer any significant mechanical simplification as compared with the helicopter. All of them will probably require two or more rotating rotors, fans or propellers which will have to be interconnected with the multiple power units by shafts and gears very similar to those which are judged so undesirable in the helicopter. VTOL aircraft may—and, if possible, obviously should—incorporate some form of gas drive to their lift-generating units (instead of shafts and gears) on a system analogous to the tip-driven rotor used on certain types of helicopter. Such a development can go a long way towards reducing mechanical complexity.

Some, at least, of the later VTOL systems hold promise of operating costs significantly lower than the helicopter can ever hope to achieve. Indeed, this is the main reason for supposing that one of the later systems may ultimately succeed helicopters in all scheduled transport applications. An aircraft such as the helicopter, which has to drag one or more rotors "edge-on" through the atmosphere in cruising flight, suffers a serious drag, and hence economic, penalty. The later VTOL systems avoid this undesirable feature and may therefore ultimately offer both higher speeds and lower costs.

The most promising long-term VTOL solution to the city-centre requirement seems likely to be that which combines the minimum of mechanical complexity with the highest cruising speed in relation to the installed power and, as a result, which has the lowest operating cost.

Summing Up

The airlines have a firm requirement for a new vehicle which is suitable for direct operation between city centres on stage lengths of up to perhaps 300 miles. This new aircraft must have operating, engineering and cost characteristics appropriate to such operations. The helicopter holds promise of being able to meet this requirement first and may achieve the status of economic scheduled service by the mid-1960s. However, the helicopter has certain fundamental deficiencies in speed and economy which result from the high drag of its rotor. Its mechanical complexity is also a drawback. For these reasons it seems possible that helicopters may ultimately be succeeded in airline use by some new type of VTOL aircraft which employs one of the fan-lift, tilt-wing, tilt-rotor or deflected-slipstream systems which are still at an early stage of development.

However, the helicopter's lead in time over these later types of aircraft suggests that rotorcraft should have a useful life as scheduled transport vehicles of at least 15 years, provided they can be developed in suitable form and put into service within about the next seven years. This conclusion emphasizes the importance of the Fairey Rotodyne and Westland Westminster helicopters, both of which hold promise of meeting fully the scheduled operators' requirements.

In conclusion, something should be said about STOL—short take-off and landing—aircraft. The airline industry—and this article—has so far considered only two methods of providing scheduled air transport. These are:—

(1) The conventional fixed-wing aeroplane which operates from runways long enough to give the lowest operating costs achievable with an air vehicle. As we have seen, these long runways mean that airports must be distant from the centres of the cities served, thus nullifying much of the speed of the aeroplane on short journeys.

(2) Some new type of vehicle which can operate from such small spaces—of up to perhaps 400 ft. by 400 ft. in area—that the operating stations can be sited in the centres of cities and thus make possible direct air services between city centres. This requirement has been taken to mean VTOL because of the premium on space near the centres of all cities. It is, of course, accepted that operations of this kind must be more expensive than fixed-wing services. However, a modest increase in fares should be justifiable on stage lengths of up to perhaps 300 miles because of the improved service offered to the passenger.

The question arises whether or not an STOL vehicle can offer another solution to the airlines' problem—and if this solution is likely to be more satisfactory than the VTOL aircraft flying direct between the centres of cities. If VTOL aircraft are overloaded so as to require a short take-off run, their economics can be improved. But they will at the same time require larger sites from which to operate. Certain other flight systems which only provide STOL performance—such as jet flaps—also become a possibility if a field length in the range of 500 to 1,000 ft. is available. STOL operations can be conducted at lower costs than VTOL but the costs will still be somewhat higher than those of conventional fixed-wing aircraft.

The point at issue is whether or not the airlines should go for a lower-cost short-haul vehicle than is possible with VTOL but which will have take-off and landing characteristics which normally preclude operations right into the centres of cities. STOL aerodromes could usually be nearer the centres of cities than the great conventional airports but they would, in most cases, still have to be some way out. The majority view in the airline industry, at the moment, seems to be against the STOL solution and in favour of VTOL.

On the face of it there are good reasons for this. However, a final assessment must depend on the comparative economics and operating problems of VTOL and STOL vehicles. Until we have more answers based on practical experience—particularly about city-centre operations in all weathers—it is difficult to pass final judgment.

Meanwhile the helicopter is entering the lists. This challenger will certainly have to exploit its VTOL characteristics to the full if it is to break into the airline business despite its high operating costs. If, and when, it does so, perhaps it will also set a pattern for the longer-term future and thus establish VTOL operations direct between city centres as the main pattern of short-haul air transport in the years to come.

NEWS OF INDUSTRY

Welding in Britannia Assembly

ONE of the manufacturing techniques employed by the Bristol Aircraft Ltd., in the assembly of the Britannia is the Argonarc welding process developed by British Oxygen Gases, Ltd. Used in the production of a number of the aircraft's internal-structures and supply systems, the process is also used in the manufacture of the Proteus turboprop by Bristol Aero-Engines, Ltd.

An important characteristic of this type of welding is its suitability for joining light-gauge materials which are difficult to weld by some other methods. In the assembly shops engaged on detail work for the Britannia the process is being successfully employed on stainless-steel sheet in thicknesses down to 0.009-in. Structures are also being built by the same method in light-gauge aluminium and magnesium alloy sheet and extruded sections.

Argonarc is used to weld the aluminium-alloy ducting for the cabin-pressurization system and the aluminium-alloy and stainless-steel piping for the fuel system. It is also employed in the fabrication of the airliner's water-tanks, door-frames and engine-nacelle fairings, and a number of structures on the flight deck including the supporting framework for tables, instrument panels and seating.

Instruments on Show

AT the fourth International Instrument Show held in London by B. and K. Laboratories, Ltd., between March 24 and 29, a number of British and overseas companies exhibited test and measurement equipment employed in the field of aeronautics.

The Ampex Corporation of California displayed a multi-channel magnetic tape recorder (series 800); an MR-100 missile recorder, and a type AR-100 airborne recorder. The series-800 unit is a compact lightweight recorder designed for precise data recording under airborne conditions, and various models, employing from two to 14 tracks, are used by a number of American aircraft manufacturers.

Incorporating sub-miniature units, the MR-100 missile recorder/reproducer records in one direction for the full reel of tape, stops tape motion, and then reproduces the recorded information in the reverse direction. The exhibit at the show was a mock-up of the equipment used in the nose cone of the Atlas ICBM. The third of these airborne recorders, the AR-100, weighs 19½ lb. and will operate over a temperature range of −55° C. to +71° C. in conditions of 100% humidity. With a tape speed of 7½ in./sec., this unit is for recording only.

Radar components and associated test equipment were displayed by a number of companies. The Raytheon Manufacturing Co., of Massachusetts, showed reflex Klystron oscillators for radar communications microwave test equipment and a "Platinotron," a new type of electronic valve for use in missile-tracking instruments. A portable X-band test set for use by radar system operators in the testing and alignment of radar transmitters and receivers working in the 8,500 Mc/s. and 9,600 Mc/s. range was exhibited by G. and E. Bradley, Ltd., of London.

Pulse-width multicoders intended for use in aircraft and missile testing were on the stand of the Applied Science Corpn., of Princeton, New Jersey. These units record directly on to a single magnetic tape track, for subsequent playback and separation. Bruel and Kjaer, of Copenhagen, displayed a wide range of instruments including an accelerometer set for the measurement of velocity and displacement of vibrations in aircraft and other vehicles. Strain-gauge measuring instruments for static and dynamic measurements were exhibited by the Peekel Laboratory for Electronics in Rotterdam.

Illuminated Indicators

ELECTROLUMINESCENT lamps are now in production in this country—by Thorn Electrical Industries, Ltd.—for a number of special uses. One which promises to be of wide application is the Thorn multiple indicator block.

The electroluminescent lamp is a luminous condenser in which a phosphorous or light-emitting material is sandwiched between two conducting surfaces, one of which is transparent. When an alternating voltage is applied across the condenser the material emits light which passes through the transparent electrode. Since light is only generated between the electrodes any shaping of one or other of them is reproduced in the pattern of the emitted light—a fact which is made use of in aircraft cabin warning signs, in which the back electrode is shaped in the form of the required legend.

In the indicator block, the back electrode is divided into isolated circles of the required size, with individual contacts, and the assembly is cast in plastic to make a single block. Currently produced blocks contain five separate indicators, but blocks with larger numbers—for example, 16 or 25 circles—will shortly be available. The indicator so formed is very much smaller than any conventional indicator, and is considerably more robust. It requires an AC voltage supply. The higher the frequency the brighter is the light. But since more rapid deterioration takes place at higher frequencies, about 400 c/s proves to be the optimum. However, 50 cycles can be used if the indicator is to be viewed in conditions of low general brightness.

Two hundred to 300 volts are needed, the brightness rising continuously with voltage up to the breakdown point of the condenser, and at 400 c/s the current consumption per indicator is about 100 microamps. At present there is considerable variation in running life from one block to another, so for the present these indicators are being recommended only for those normal indicator applications involving intermittent use, in which space is an important factor.

Transistor Films

MULLARD, LTD., has produced a range of 16-mm. films describing how transistors are made, how they work and how they are used.

Three of the films are intended for those who have a background knowledge of electronics. The first is "The Transistor—its Principles and Equivalent Circuit," which is a 15-min. sound film in colour. The others are the two parts of "The Junction Transistor in Radio Receivers," which are in black and white. The first part, "Design of an I.F. Amplifier," is 15 min. long and the second, "The Complete Receiver," is a 10-min. film.

These three films can be borrowed, free of charge, from the Publicity Division, Mullard, Ltd., Mullard House, Torrington Place, London, W.C.1.

For showing to non-technical audiences another film and a film-strip have been produced jointly by the Mullard Educational Service and the Educational Foundation for Visual Aids. They are "The Principles of the Transistor," a 20-min. sound film intended as a teaching aid, and "Semi-Conductor Devices," a 31-frame 35-mm. film-strip in colour.

INSTRUMENT CALIBRATION.—To check the accuracy and calibrate its fuel gauge installations in aircraft, Waymouth Gauges and Instruments, Ltd., has a specially equipped test van. On the right a fuel calibration of a Hawker Hunter is in progress, fuel from the tanker passes through the van's pump and meter into the aircraft, and spot readings are taken. Further readings are made when the aircraft tanks are emptied.

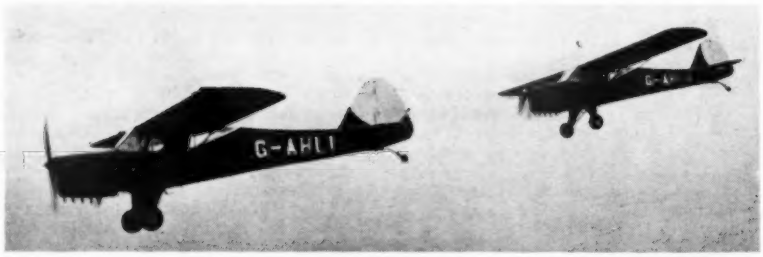
PRIVATE FLYING

H.J.C.'s Club Commentary:

The R.Ae.C. Rally

Women in the Air

Busy Thruxton



A WORKS FLYING CLUB.—The Auster 3, G-AHLI, seen here is now operated by the Vickers Flying School at White Waltham. The other, G-AHLK, is used by Supermarines at Christchurch. Both are Gipsy Major powered.

● SOME DETAILS are now available about the invitation air rally which the **Royal Aero Club** is organizing at Shoreham Airport from May 29 to June 1.

Visiting aircraft from this country and abroad are due to arrive at Shoreham on the afternoon of May 29. On the following day there will be a visit to Arundel Castle, and in the evening the visitors will be guests of the Mayor of Brighton. The Saturday will be devoted to visits to London, with lunch at the R.Ae.C., and to a polo match at Cowdray Park.

On the Saturday evening a banquet and dance will be held at the Grand Hotel at Brighton; guests will leave for home on the Sunday, when and as they feel like it. Tickets for the banquet, at 35s. each, are available for those who are unable to attend the entire rally.

Application forms and other information can be got from the R.Ae.C. Air Touring Department at 19 Park Lane, London, W.1. Apply quickly.

● A FLYING and gliding weekend is being organized by the **British Women Pilots' Association** at Shoreham on May 31 and June 1. The Isle of Wight Gliding Club is co-operating, and will provide use of a two-seat glider on the Saturday. Powered flying is to take place on the Sunday. Accommodation and meals will be provided by the gliding club for 18s. 6d. a day. Temporary membership costs 10s. and gliding launches will cost 3s. each.

Members interested in attending should contact Miss Janet Ferguson, the secretary of the B.W.P.A., at Chetwode, Higher Denham, near Uxbridge.

● CADETS of the **Women's Junior Air Corps** will have a chance of flying in the Corps' Messenger, G-AKXC, named "Grey Dove III," again this year. This season's flying programme began at Croydon on Easter Sunday, April 6, and the aircraft was kept busy throughout the holiday. The following week-end it was at Shoreham, and for the rest of this month is scheduled to be at the following places:—

April 19, Southend; April 20, Ramsgate in the morning and Lympne in the afternoon; April 26, Kidlington; April 27, Old Warden (morning) and Luton (afternoon).

The Messenger is flown by Mrs. Joan Grimaldi. She has recently relinquished her position as aviation adviser to the Corps so as to study for her senior commercial licence, but will remain as Corps pilot throughout this summer and autumn.

Keeping Down the Cost

SINCE the Thruxton Jackaroo first appeared (it was described in THE AEROPLANE of November 16, 1956, and July 12, 1957) it has become increasingly popular, and we understand from Sqn. Ldr. J. E. Doran-Webb, managing director of Jackaroo Aircraft, Ltd., that orders for around a hundred aircraft and conversion sets have been given.

So far nine aircraft have been built and flown, including the prototype, and at present a batch of six is going through the shops. The present production rate is three a month, to be increased soon to six.

The Jackaroo is a four-seat conversion of the Tiger Moth and differs mostly in having a wider centre fuselage section to accommodate four people in two pairs. Otherwise standard Tiger Moth components are used throughout. The cost of a Jackaroo, fitted with a Fairey-Reid metal propeller, is £1,195.

The conversion set, which is available to companies so that they can turn Tiger Moths into Jackaroos, consists of the centre fuselage and costs £600. To produce these sets a group, comprising four companies, has been formed, each responsible for particular parts; the completed sets are sent to the parent firm at Thruxton for checking and dispatch. The set can be contained in a crate 6 ft. by 3 ft. 6 in. by 2 ft. 6 in.

Arrangements are being made for conversions to be done in Australia, New Zealand, India and Pakistan, and there is already a Jackaroo company in Rhodesia.

Four Jackaroos are now in service with the Wiltshire School of Flying. They have Goodyear disc brakes and full equipment, and the type is currently being evaluated by the A.R.B. to allow night-flying instruction to be given.

The accompanying picture shows the Jackaroo "production line" at Thruxton. The overhead expenses are obviously low; and it is certain that it is only by such means that private aeroplanes can be produced cheaply in this country.

Photograph copyright "The Aeroplane"

From the Lecture Room

Jet Assisted Vertical Take-off

ON APRIL 11, Dr. Charles H. Zimmerman, aeronautical research engineer with the N.A.C.A. at Langley Field, Virginia, lectured to the Helicopter Association of Great Britain on "Powered Lift Systems." He discussed three different approaches to the design of "STOVL" (short take-off and vertical landing) aircraft for inter-city operation and also considered the design of a large long-range jet transport which could operate from small aerodromes.

The aircraft described by Dr. Zimmerman were noteworthy because all employed vertical jet lift as well as slipstream deflection, tilting wings or jet deflection.

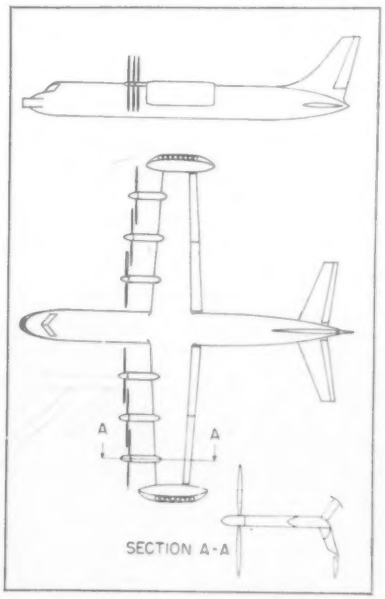
Two STOVL designs were considered which would meet the same requirements. These were a payload of 13,500 lb., a still-air range of 1,000 stat. miles at 300 kts. at 20,000 ft. and the ability to hover for three minutes at sea level with full load.

A third STOVL aircraft was considered which met the same requirements in every respect except cruising, which was at 350 kts. at 30,000 ft. It used jet deflection as well as vertical jet thrust for hovering. All three aircraft had to retain full control and the ability to land safely following failure of a power unit.

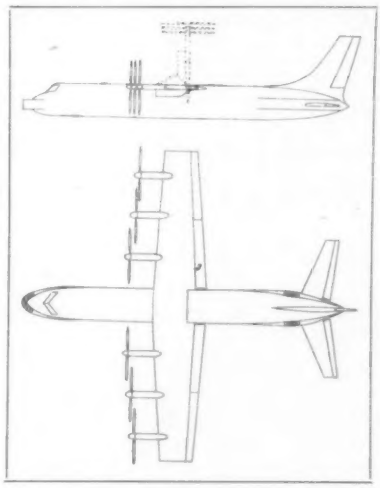
Discussing the deflected-slipstream and tilt-wing STOVLs, Dr. Zimmerman explained that the most significant difference between these designs and the tilt-wing and deflected-slipstream configurations which have been proposed in the past is in the use of small lightweight turbojets to give STOVL capability rather than relying on excess power in the main propulsion powerplants. An attempt has been made, he said, to estimate the characteristics of these STOVL aircraft by installing only enough turboprop power for a moderate cruising speed and altitude, and developing as much STOVL capability as reasonably possible through the use of large propellers. Turbojets are then used to give VTOL capability under standard sea-level conditions.

The use of turbojets avoids, to a large extent, the problem of wing stall during slow, steep approaches. It also minimizes the ground-effect problem with deflected-slipstream aeroplanes.

These phenomena have to be considered when operating near the minimum speed possible with a given amount of turbojet lift. The essential difference is that the dynamic pressures, both in and out of the slipstream, are reduced at a given lift coefficient by the ratio $\frac{(\text{weight} - \text{jet lift})}{\text{weight}}$ and the disturbing effects of wing stall caused by either steep approach or ground proximity are correspondingly lessened.



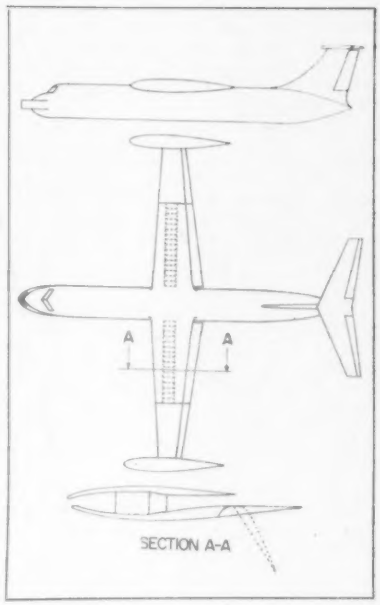
This deflected-slipstream STOVL aircraft has 16 2,000 lb. thrust jet engines in wingtip pods and four similar engines at its nose, in addition to the four 2,650 h.p. turboprop engines which drive the six propellers via a common shaft.



Additional vertical thrust for this tilt-wing STOVL aircraft is provided by seven 2,000-lb. thrust jet engines at the nose and eight similar engines along the side of the rear fuselage.

Also, and probably more important, low enough speeds for landing at a heliport are attained without requiring extreme values of C_L from the propeller-wing system. The jets themselves produce ground interference effects which must be considered but should not be harmful for the aircraft described.

Use of auxiliary jets for supplementary lift at low speeds provides a means of pitch control and does not additionally complicate the aeroplane as might appear to be the case. The auxiliary jets actually give the designer more freedom to proportion his aircraft so as to provide good stability in forward flight without excessive horizontal tail area and to accommodate a large C.G. travel.



For vertical landing the thrust from the 32 buried engines in the wing of this STOVL aircraft is deflected downwards. Five jet engines at its nose give additional vertical thrust, which is also used to trim the aircraft.

In the aircraft described, the primary propulsion units are used to the fullest extent possible to minimize the lifting jet capacity required. There are certain disadvantages of the jets—their fuel consumption is very high and it is desirable to use them only for the minimum of time during take-off and landing. They are extremely noisy. They present serious soil erosion, dust and debris problems unless they can be kept well away from the ground by mounting them high on the aircraft.

Assuming mechanical safety requirements to have been met, propeller-wing type STOVL aircraft having adequate reaction control units should prove very safe and reliable because of their very rapid decrease in power required with increase in speed near zero speed, and the large amount of excess power available at flight speeds from 20 knots to 200 knots. If controllable nozzles are provided on the lifting jets, these craft can be flown and controlled using the jet engines alone and landed on a small airport should there be a complete failure of the turboprop system.

Jet STOVL Aircraft

The jet STOVL aircraft uses a large number of small, high thrust-to-weight ratio engines in the wing for propulsion and to supply the major portion of the thrust required for vertical take-off and landing. The thrust of the wing jets is turned through substantially 90° for hovering flight. Additional jets at the fuselage nose provide longitudinal trim and control, and also give the additional

lift required to support the aircraft in hovering flight. When cruising some wing engines will be shut down and the remainder operated at their optimum cruise thrust.

The same objections apply to this aircraft as to the propeller STOVL types previously discussed. It will be powered by 30 to 40 high thrust-to-weight ratio turbojets which will certainly be expensive. They must be capable of precise control during hovering flight and hovering landing. These problems are not insurmountable; neither can they be dismissed lightly.

The noise output of this aircraft will be very great during take-off, initial climb, and landing. It may very well be the major deterrent to the development and use of such aircraft. The noise output to the surrounding community can be minimized and localized with some sacrifice of economy by using the very steep climb-out angles possible with this type of aircraft.

An aircraft of this type will depend for safety on the large number of powerplants, and the large excess of thrust available at all speeds above 20 or 30 knots. It should be capable of flying to and landing on even the smallest airport used by conventional aeroplanes after losing half of its turbojets in either or both wings.

	Deflected-slipstream STOVL	Tilt-wing STOVL	Jet-deflection STOVL
Weights:			
All-up weight—lb.	78,800	71,900	74,000
Empty weight—lb.	50,377	44,990	42,105
Payload—lb.	13,500	13,500	13,500
Operational equipment—lb.	2,155	2,155	2,155
Cruise fuel—lb.	10,650	9,650	12,900
Hover fuel—lb.	2,118	1,605	3,340
Dimensions:			
Overall length—ft.	98	98	96
Wing span—ft.	100	90	96
Wing area—sq. ft.	1,125	1,125	1,000
Propeller diameter—ft.	16	16	—
Power and thrust:			
Turboprop engines—number and h.p.	4 at 2,650	4 at 2,350	—
Jet engines—number and thrust in lb.	20 at 2,000	15 at 2,000	Wing jets—32 at 2,000 Nose jets—5 at 2,000
Design assumptions:			
Zero-lift drag coefficient	0.0339	0.0291	0.0257
Effective wing span—ft.	89.1	76.7	81.5
Specific consumption—			
Turboprop—lb./h.p./hr.	0.6	0.6	—
Jet—lb./lb./hr.	0.9	0.9	0.9
Specific powerplant weights—			
Turboprop propulsive system—lb./h.p.	0.8	0.8	—
Installed jets—lb./lb.	0.2	0.2	0.2
Propeller cruise efficiency—%	80	80	—
Propeller static-thrust figure of merit	0.70	0.70	—
Weight of fixed equipment—lb.	11,524	11,524	11,524

Details of the three STOVL aircraft illustrated and described in the text are given in this table.

Long-range Transport

If long-range transports are to be capable of hot-day operation from airports having runways of moderate length (5,000 to 6,000 ft.) it can readily be shown that an installed thrust of the order of 0.3 of the take-off weight under standard conditions is required. Also it will be necessary with current wing loadings to develop a lift coefficient of the order of 4 during the final approach and the ability to climb at such a lift coefficient in the event of a baulked landing. This can be achieved with various arrangements for boundary-layer control or jet-augmented flap configurations.

With installed auxiliary thrust, a lift coefficient of 4 can be developed, permitting a landing on a 4,000-5,000-ft. runway under standard conditions at a wing loading of 70 lb./sq. ft.

This would, of course, permit great flexibility of operation, since such aircraft would not be constrained to operate only from the few very large airfields in the World.

GLIDING NOTES

FORTY MILES to the S.S.W. of the Midland Gliding Club's site at the Long Mynd is a mountain group called the Black Mountains, north of Abergavenny—not to be confused with the other Black Mountains beyond Brecon. This lot occupies the region where the counties of Brecknock, Monmouth and Hereford join, and is made up of several parallel ridges running N.W. to S.E. When a N.E. wind hits the first ridge it provides magnificent soaring along a 10-mile beat over an escarpment rising to 2,306 ft. at one end and 1,743 ft. at the other.

This was proved when Ted Stark and John Knotts took a privately owned Skylark 2 there from the Midland Club for the week-end March 22-23 and found "slope lift" up to 2,000 ft. above the mountain top. They had been lucky to find a co-operative farmer who towed their trailer with his tractor up a rough track to the launching point.

Ten days later, a party from the Windrushers R.A.F. Gliding Club at Bicester, who were camping for a week at the Long Mynd, were escorted there with their Olympia by Ted Stark, who then went back to fetch his Skylark. In this he climbed 2,400 ft. above the summit, but the Olympia got too far down wind so set off across country.

There are several apparent landing runs on the top, but they have yet to be examined for hidden boulders and other snags. At the bottom is a safe landing field opposite the Pandy Hotel. To help with bungy launching, a group of local boys can be recruited with a bribe of 1s. per launch per group. The farmer charges 5s. to 7s. 6d. per tractor tow, depending on how far up your own car can pull the trailer to start with. Anyone else wanting to try out the site should first write to Mr. Stark at the Midland Gliding Club.

An interesting lee wave at the Long Mynd in a S.E. wind on March 15 was soared by Ted Stark to 5,500 ft. a.s.l. The wave, with its corresponding cloud, was about 10 miles long and showed rather an odd orientation, since this was neither at right-angles to the wind nor parallel with the north-to-south escarpment of the Mynd; it was a compromise between the two, being orientated S.S.W. to N.N.E.

* * *

ON Good Friday, April 4, the Midland Club's Easter inter-club rally got off to a hopeful start with a north-west wind blowing up the hill and small cumulus clouds with plenty of sunshine between, and an occasional snow shower visible on the horizon. "Jock" Findlater, from the Meteorological Office, explained that this was only a temporary break in the long spell of north-easterly winds, and was due to a small depression coming up the Channel from Brittany and then moving up the North Sea.

The task was distance along a line passing through Lasham, 120 miles to the south-east, and 10 of the 13 competing machines got away. Actually there were 15 entered, but the two new Olympia types destined for the World Championships, Nos. 419 and 415 (19 and 15 metres' span respectively) were not ready to take part. That left four entries from the Midland Club, three from Derbyshire and Lancashire, two from Imperial College, and one each from London, Surrey, Cambridge University and the R.A.F. Windrushers. There were seven Skylarks, four Olympias, a Gull IV and the Midland Club's T-42b (Eagle).

Frank Irving, in the only Skylark 3, was the sole pilot to reach Lasham, evidently because his gliding angle was good for 20 miles under a high overcast, starting from the top of his last thermal at Newbury; whereas David Scallon, who landed a mile short of Lasham, and Michael Kaye, who was three miles short, each had a Skylark 2. Irving, who got away early, encountered "midsummer day" soaring conditions to Newbury, but only in quality, not in duration, for he put down at 15.30 hrs. On the other hand, Ken Blake, who reached Abingdon at 17.00 hrs., found long gaps between thermals. Charles Green took fourth place with 105 miles to a field near Cheam School.

So, at the end of the opening day, the first five places were occupied by Skylarks from Imperial College, Surrey, Derbyshire and Lancashire, Midland, and again Derbyshire and Lancashire, respectively. In addition to the Mynd Cup, which goes to the winner, there is a beer tray for which the Midland and the Derbyshire and Lancashire Clubs have been competing annually, off and on, since it was first offered 20 years ago.

A. E. SLATER.

(The second part of Dr. Slater's Easter report will appear next week.)

CORRESPONDENCE

Captain Olley and K.L.M.

FROM THE AEROPLANE of March 28, No. 2430, page 409, I learned the sad news that Captain Gordon Percy Olley passed away on March 18.

In the early days of civil aviation when he entered K.L.M.'s service as a pilot at Schiphol Airport, of which I happen to have been airport manager since 1920, I had the pleasure of making his acquaintance and learned to appreciate the "quick-moving and compact figure of Gordon Olley, with his fast, clipped way of speaking," as is so rightly described in the said article.

During the latter decades, our paths, to my regret, only crossed rarely, but the picture of this keen, alert, capable and enterprising little man, during the hard but nevertheless pleasant first years of civil aviation, will never fade from my memory.

Schiphol, Amsterdam. U. F. M. DELLAERT.
Director of Schiphol Airport, Amsterdam.

A Yorkshire Memory

I WAS sorry to hear of the Yorkshire Aeroplane Club [THE AEROPLANE, April 4]. I took my "A" licence there in December, 1938. There was also a Tipsy in addition to the aircraft you mention. Capt. Worrall, who pioneered Imperial Airways' Africa route, was the C.F.I.

A great number of the club members made a name in R.A.F. squadrons during the War, and I hope that something can be done to keep the club going.

J. N. AIREY, B.Sc.(Econ.), D.P.A., A.M.B.I.M.,
Part-time Flying Instructor, East Bucks Aero Club.
Ealing, London, W.13.

Long-range Transport and Missiles

I WONDER why it is that the Government's attitude towards Transport Command appears to be so short-sighted?

We have, or soon will have, surface-to-surface missiles in service with our Forces. But do we have large transport aircraft, of long range, capable of carrying them to bases where they are needed? No!; and apparently nothing in mind. The only transport aircraft of any size, the Beverley, is not much use, range at full pay-load of 44,000 lb. being only 200 miles and airspeed of 145-188 m.p.h. Its long-distance (3,000-mile range) pay-load is only 1,000 lb., a practically useless amount for this purpose.

What we need is an aircraft like the American C-133 or better, which I am sure our aircraft industry could provide. It is time this serious gap was closed before it is too late.

Southbourne, Bournemouth. P. J. TIPPINS.

Assemble the Autogirationists!

AS so many of my long-suffering friends, acquaintances—yes, and enemies—will know, I belong to that band of rotary-wing enthusiasts who, having become enamoured of the helicopter find their belief in the Autogiro to be strengthened.

General Parham is also a member of that band and we are at one accord in the belief that with all the present-day knowledge of alloys, fuels and airframe and power-plant design techniques, an Autogiro could be built and flown with a performance which could compare favourably with that of any present-day helicopter.

Following hard upon the work of Cierva came collective and cyclic-pitch control by Hafner in the AR III, circa 1936, the tricycle undercarriage, hydraulic clutch and brakes in the C.24 Autogiro so successfully built by the de Havilland technical school students circa 1932, and liquid-fuel tip-jets for rotor acceleration by Nagler, U.S.A., circa 1953/1954.

All these and every modern helicopter embody the principle of autogiration as a basic and necessary "safety feature."

Thoughts of the C.24 remind me of a wish expressed during 1957 to the Director of the Science Museum. The wish was that the C.24 Autogiro, languishing for many years in a hangar at Byfleet, might be released to me and a small band of supporters for restoration at our expense to an airworthy condition and after demonstration returned to the museum.

The offer was made after an inspection which disclosed the excellence of its condition, though a few parts were missing. The offer was declined.

This aircraft built, it must be remembered, around 1932 had the comfort of a tandem two-seater cabin and with development could have done all the vital work performed by the C.30 Autogiros during the 1939-1945 period in the "Very First Line" of the Defence System of this country. This work ranked in its value with that performed by the Blenheims on the same task, namely the calibration of the radar CHF chain around these islands, work of which little has been written, but it makes a good story for those who were engaged upon it.

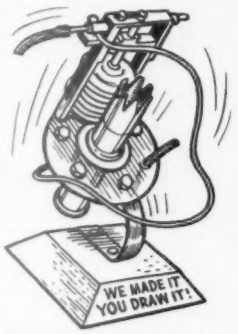
Regrettably, the last but one airworthy C.30 Autogiro was destroyed a few weeks ago; one other, G-ACUU, remains, stored in the Midlands. Another, complete in R.A.F. livery, is in the Science Museum, but not, I think, on display.

Let all the protagonists come together to discuss what shall be done—and soon! I will be there!

Three Bridges, Sussex. NORMAN HILL.

Groundabout

Smart Art Dept. At a ramjet establishment in this country, the two - men - and - a - boy staff seem to have taken to heart the suggestion once made here that it is sometimes quicker just to make the part instead of waiting for drawings before cutting metal. They've made a sort of symbolic mobile out of a fuel valve, a pressure capsule, a test-rig fuel distributor and other items, the whole mounted and bearing the challenge you see here.



All right, then—try this for size.

*

The Flying Years. Suddenly it's 1918, and I feel years younger. Then years older, for the R.A.E. Farnborough have just rung up to ask me if I could help them locate a genuine R.F.C. flying jacket and helmet. Their apprentices are restoring an S.E.5, Hispano-powered, to flying condition for the Shuttleworth Trust and they want to get the lovely old biplane and its pilot in period, and very properly, too. I was able to put them on to several promising tracks but, like the Red Indians, who send out several scouts to ensure that one will get through, this column now spreads the appeal a little wider.

*

"He has so much confidence, he writes his diary a month in advance."

*

Heap Big Trek. The F.A.I. also follow the Redskin example. To get to their Easter Week Los Angeles conference, their president, Ken Bartlett, crossed in the "Queen Mary," the R.Ae.C. chairman, Kenneth Davies, travelled B.O.A.C. Monarch, and the other R.Ae.C. representative, Colonel Preston, flew B.E.A. to Frankfurt, then to U.S.A. by U.S.A.F. The natives turned out to be friendly and all three braves reached the big pow-wow.

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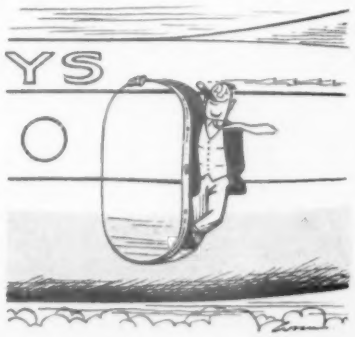


by Gren

NOTES AND EVENTS

PRIVATE VENTURE.—The Williamson Manufacturing Co., Ltd., has received an order from the M.o.S., on behalf of the Air Ministry, for its F117 Universal air camera, which is a successor to the F24. It takes 4½-in. square photographs.

DIGICATOR.—A new electronic meter has been introduced by the Solartron Electronic Group, Ltd., of Thames Ditton, Surrey. Known as the "digicator," it gives readings in 2-in.-high neon-lit figures. Any variable which can be transduced into a voltage which alters with the variable can be measured in figures on the "digicator." Its accuracy is ±1%.

PRIVATE AIRSTRIP.—Ind Coope and Allsopp, the Midland brewers, has taken over the former R.A.F. airfield at Tatenhill, near Burton-on-Trent, as a base for its D.H. Dove. A central strip of the main runway is to be illuminated allowing the airfield to be used at night.

LIGHTWEIGHT RADAR.—Radio Corpn. of America is demonstrating a lightweight weather radar, the AFQ-50, to airlines and business operators in the U.S.A. It weighs 50 lb. and has an effective range of 80 miles.

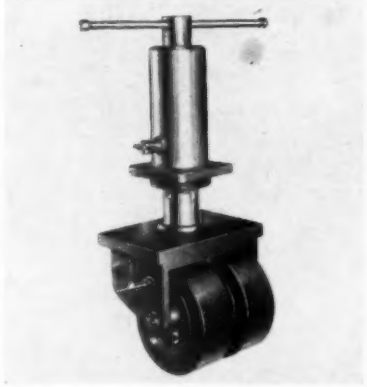
AIRCRAFT FUELLERS.—The British Petroleum Co.'s Aviation Service has ordered two specially designed 10,000-gal. aircraft fuellers. One is to be built by Thompson Bros. (Bilston), Ltd., of Bilston, Staffs, and the other by Saunders-Roe (Anglesey), Ltd., at its Beaumaris works. They will have three times the capacity of fuellers now used on airports and have been primarily designed for fast fuelling of jet transports. Known as the "Yorkshire" type, two of these vehicles will be able to supply 18,000 gal. of fuel by pressurized underwing fuelling in about 15 min., equivalent to over four tons a minute.

NEW PREMISES.—The new address of the Midlands office of the Elgar Machine Tool Co., Ltd., is 1075 Kingsbury Road, Erdington, Birmingham, 24; telephone number, Castle Bromwich 3781-82.

WOOD LAMINATES.—The Permali Group, now in its 21st year, has recently opened a new factory at Gloucester housing the combined production of Permali, Ltd., Hordern-Richmond, Ltd., and Jabroc, Ltd. This is said to be the largest plant manufacturing densified wood laminates in Europe.

AT OLYMPIA.—There will be 250 exhibitors at Britain's first Chemical and Petroleum Engineering Exhibition to be held from June 18-28. During the exhibition, which is sponsored by the British Chemical Plant Manufacturers' Association, and the Council of British Manufacturers of Petroleum Equipment, there will be a symposium on "The Organization of Chemical Engineering Projects," and films will be shown demonstrating the contribution made by British chemical and petroleum engineering firms to the growth of the industries which they serve.

TEST EQUIPMENT.—Barlow-Whitney, Ltd., of 2 Dorset Square, London, N.W.1, have introduced three larger models of their established series of HTC humidity test cabinets. Self-contained units which only require connection to electrical and water services, the cabinets can produce relative humidity conditions from 40 to 99% with temperatures of up to 70°C. The Midlands office of this company has now moved to 44 Queen's College Chambers, Paradise Street, Birmingham, 1, and is managed by Mr. H. Melrose, A.M.I.E.E., A.M.C.T. The telephone number is now Midland 6897.



WEIGHT LIFTER.—Flexello, Ltd., of Slough, has produced this 3-4 ton jacking castor, the design of which is based on a principle allowing free-swivelling action of the castor without affecting the jacking action. Overall length of the unit is about 40 in. and it weighs about 450 lb.

MAP MAKER.—Airborne mapping equipment designed and built by Canadian Applied Research, Ltd., of Toronto (a member of A. V. Roe, Canada, Ltd., and the Hawker Siddeley Group), is to be installed in the Lockheed RC-130 Hercules turboprop aircraft of the 1370th Air Photographic Group of the U.S.A.F. Known as the Mk. 5 Airborne Profile Recorder, the equipment is an improved precision radar designed for air-survey work and is capable of measuring topography from 1,000 to 35,000 ft.

Company Notices

NEW COMPANIES

Flight Servicing Co., Ltd. (601,411).—Private co. Reg. March 27. Cap. £2,000 in £1 shs. Objects: To acquire the business of aeronautical engineers and consultants, now carried on at Croydon Airport, Croydon, Surrey, as The Flight Servicing Co., by William A. Webb. Subscribers (each with one sh.): W. A. Webb, 21 Leinster Av., London, S.W.14, aeronautical engineer, and Mrs. Edith Webb, of the same address. William A. Webb is permanent director. Solr.: L. M. Graziani, LL.B., 11 Westbury Road, Beckenham. Reg. off.: Room 57, Croydon Airport, Croydon, Surrey.

African Safaris, Ltd. (601,241).—Private co. Reg. March 25. Cap. £100 in £1 shs. Objects: To co-operate with Hunting-Clan Air Transport, Ltd., in carrying on its airline operations between Europe and Africa known as "The Safari Service," etc. Permanent directors: Lindsay C. Hunting, Ethorpe House, Packhorse Rd., Gerrards Cross, Bucks, director of Donkin and Co., Ltd., etc.; Reginald R. S. Cook, Lakenheath, Tilford, nr. Farnham, Surrey, director of Alfred Trill and Co., Ltd., etc. Sec.: R. E. Treacher. Reg. off.: 72 Wigmore St., London, W.1.

CHANGE OF NAME

Aircraft Components, Ltd. (364,377). Arle Court, Cheltenham.—Name changed to Dowty Mining Developments, Ltd., on Feb. 13, 1958.

New Patent

APPLICATION ACCEPTED

795,517.—American Seating Co.—"Inertia-operated safety equipment for aircraft or other vehicles."—Dec. 28, 1955. (Dec. 2, 1955.)

Application open to public inspection on May 28, 1958; opposition period expires on August 28, 1958.

Aviation Calendar

April 21.—Women's Engineering Society London Branch lecture, "Philosophy of Guided Missile Design," by Wg. Cdr. P. M. Chettle, B.Sc.(Eng.), at the Central Electricity Authority headquarters, Winsley Street, **London,** W.1, at 18.45 hrs.

April 23.—R.Ae.S. Leicester Branch A.G.M. and film show in the lecture theatre, **Loughborough College,** at 18.45 hrs.

April 25.—Inst. of Navigation meeting, "The Use of Simulators for Training Navigators to Use Radar Equipment"—a description with contributions from the R.N., the R.A.F. and M.T.C.A., at the R.G.S., 1 Kensington Gore, **London,** S.W.7, at 17.15 hrs.

April 30.—R.Ae.S. Weybridge Branch A.G.M. at the Apprentice Training School, Vickers-Armstrongs (Aircraft), Ltd., **Weybridge,** at 18.00 hrs.

May 3.—British Interplanetary Society A.G.M. in the Kent Room, Caxton Hall, **London,** S.W.1, at 18.00 hrs.

May 4.—Tiger Club Aerobatic Competition, at **Sywell Aerodrome,** Northampton.

May 6.—R.Ae.S. Luton Branch lecture, "Analogue and Digital Computers," by Elliot Bros., in the Napier senior staff canteen, **Luton Airport,** at 18.15 hrs.

May 6.—Aviation Forum A.G.M. at the Imperial Hotel, Elizabeth Street, **London,** S.W.1, at 19.00 hrs.

May 9.—Helic. Assn. of G.B. lecture, "Canadian Research in the Field of Helicopter Icing," by J. R. Stallabrass, B.Sc.(Eng.), Grad.I.E.E., M.C.A.I. (National Research Council, Ottawa), in the R.Ae.S. Library, 4 Hamilton Place, **London,** W.1, at 18.00 hrs.

May 9-11.—International Air Rally organized by the Channel Islands Aero Club, at **Jersey Airport,** St. Peter.

May 15.—46th Wilbur Wright Memorial Lecture, "Automatic Flight—The British Story," by G. W. H. Gardner, C.B.E., F.R.Ae.S., at the Inst. of Mechanical Engineers, Birdcage Walk, **London,** S.W.1, at 18.00 hrs.

Personal Notices

BIRTHS

Bullivent.—On March 29, at Redruth Hospital, to Laurie, wife of Flt. Lt. A. E. Bullivent—a son.

Dean.—On April 3, at R.A.F. Hospital, Ely, to Mary (*née* Henderson), wife of Flt. Lt. R. B. Dean—a daughter.

Hervey.—On April 2, at Winchester County Hospital, to Anne (*née* Holden), wife of Wg. Cdr. C. P. V. Hervey—a daughter.

Monaghan.—On March 29, at Nocton Hall Hospital, Lincs, to Patricia (*née* De Carteret), wife of Sqn. Ldr. K. L. Monaghan—a daughter.

MARRIAGES

Hampton—Henry.—On April 5, at Aldershot, Flt. Lt. D. J. Hampton, R.A.F., to Flg. Off. Patricia Henry, W.R.A.F.

Moon—Morrissey.—On March 28, Flg. Off. R. M. Moon, to Helene Morrissey.